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THE SOUTHDOWN.

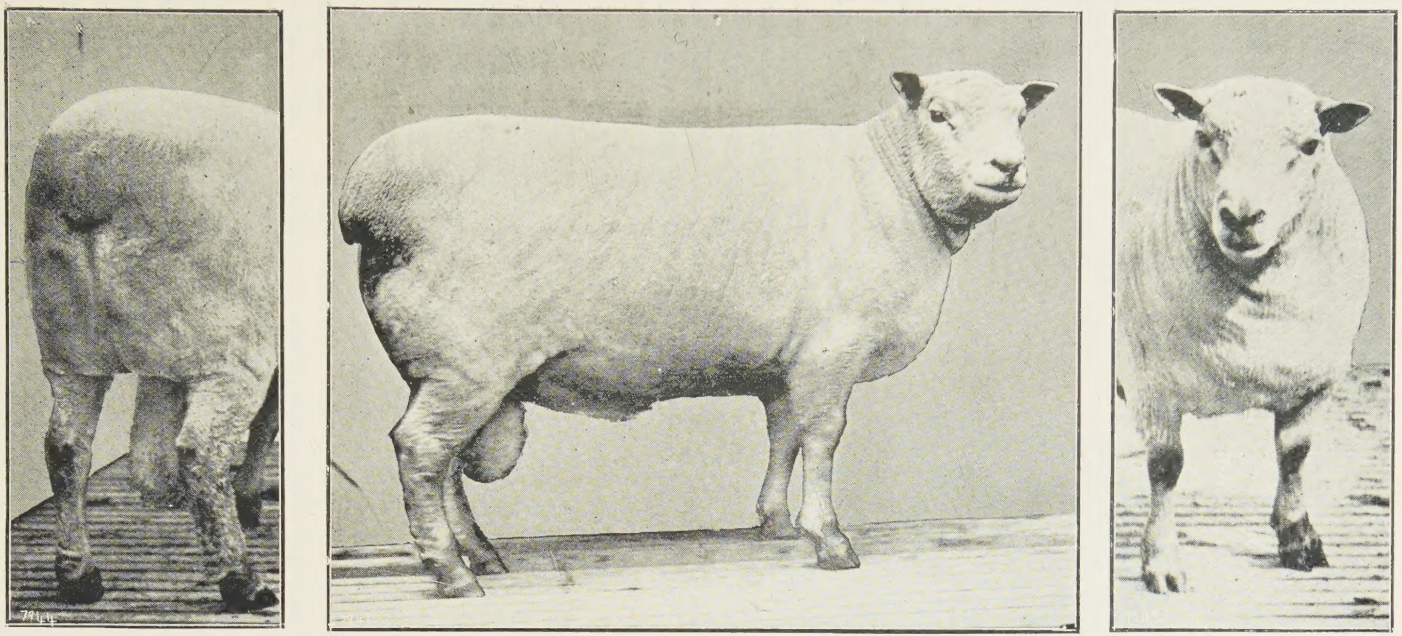
A BREED OF INCREASING IMPORTANCE TO NEW ZEALAND SHEEP-FARMERS.

H. PANNETT.

OF all British breeds of sheep the Southdown is of the purest origin. It has been declared that every British breed has been improved more or less by the introduction of blood of another breed, but the best authorities unite in asserting that the Southdown is an exception. The old people of Sussex relate the tradition that when William the Conqueror landed in England he saw the progenitors of the modern Southdown grazing on the chalk downs of England. True, the breed has been vastly improved since that time, but the improvement has been effected by selection alone. We have it on record, according to Youatt, that an

endeavour was made at one time to improve the breed by medium of the Leicester, but the effort failed, as did also the attempt to effect improvement by means of the merino. The Southdown is pre-eminently a mutton breed, and, as it combines early maturity with rapid-fattening qualities, it presents the most valuable breeding-stock to the man who realizes the importance of marketing his lambs at the earliest possible age and, therefore, with the least expenditure on food and management. It is not always the animal that gives the highest return that is the most profitable, but more often the one that gives it in the shortest time. The ideal of fat-lamb production is to turn every lamb off the mother, thus securing a return in the briefest possible time, and saving the heavy cost of growing special crops to fatten a high percentage of weaned lambs. The Southdown ram mated with such a good mothering ewe as the Romney is the very best key we have to the solution of this problem, though some may prefer such a good crossbred ewe as the Lincoln-Romney, which is a very popular ewe in the North Island. The Southdown ram will, of course, furnish a good lamb when crossed with almost any ewe, but from an economic viewpoint the Romney is probably the best sheep for the majority of New Zealand fatteners to use with this breed.

That the quality of Southdown-cross lamb is undoubted is amply demonstrated by the high estimation in which it is held in England. Many Canterbury farmers of my acquaintance who have visited the Old Country, and while there have investigated the meat trade, have all had the same experience—that the meat-salesmen of London were unanimous in declaring New Zealand Southdown-cross lamb to be the finest meat imported into Britain, and that it could pass for the best Home-grown lamb at any time—that is, when it has been carried well to Britain and has been carefully defrosted. Prominent Smithfield butchers have admitted that in times of scarcity of local lamb they have supplied New Zealand Southdown-cross lambs to their best customers, but as English production. Not only has the deception remained undetected, but the sellers have actually been congratulated on the quality, and at the same time the hope was expressed that the quality supplied would always be similar. Another factor to be considered in the meat trade is that the small meaty joint is increasing in popularity; indeed, the prevailing demand throughout the world tends to a maximum proportion of lean flesh to fat. The Southdown will certainly meet this demand, for it provides a carcase of very little waste, with the meat where it is most required, small joints, and flesh of the best quality. The mutton and lamb carcases of the future will require to be of the



C. E. Cuming, photo.]

THE SOUTHDOWN RAM.

From photographs of sheep in the Fernhill flock of Messrs. Nelson Bros., Hawke's Bay, the pictures being taken just after the sheep had been machine-shorn.

meatiest description, for, with prices likely to rule high with the expanding demand for meat and a smaller demand for the secondary parts of a carcase, consumers will favour joints giving the highest proportion of usable meat.

It may be contended that the Southdown is a small sheep, and that size, in combination with a certain degree of quality, is in the end the more profitable thing to aim at. Size, however, is a deceptive quality in the Southdown, which — to use a common enough expression — "weighs like a pig," and will give a very much higher proportion of usable meat for its size than any other breed. When together with this is considered the fact that the breed will stand exceptionally close stocking, and possesses in a singular degree that valuable characteristic in meat-production—early maturity — it must be admitted that the Southdown ram has unequalled claims as being the best fat-lamb ram extant.

C. E. C., photo.]
A Strong Ram's Head.

The Type to aim at.

The breeder should have no difficulty in picturing the type to follow in building up his flock, for the Southdown can be bred to an exceptional symmetry of form. It is a short-legged, compact sheep of fair length, providing this last-named characteristic is not made up by too much space between the hip and the last rib. The first essential, however, is *constitution*, the fundamental requirement in the successful breeding of all classes of live-stock. The best indications of constitution will be found in the head, that index of character which is so often disregarded. The keen breeder will give more study to the head than to any other feature of the animal. Even where a good body carries a weak head it is not safe to use the animal for stud purposes. It will almost invariably fail to maintain the type, much less improve it. The ideal head should have a good lively expression. The under-jaw should be strong (too many of our sheep are weak in this respect), with a fair width between the jaw-bones. The eyes should be set fairly wide apart. The ears should not be too large, and should be covered with a little wool, having a soft feel, and should have

decidedly strong roots. The nose should be of fair width across, and should be neither Roman nor dished. The whole head should indicate strength and character. The face-colour should be a mousy brown, as should also be the colour of the legs. The head should be carried on a strong muscular neck—not too long—well filled with flesh in front of the shoulders. It is most important that the frame of the Southdown should be symmetrical. Essentially the Southdown is a mutton sheep. The twist should be well let down and the leg well filled. Both the top and bottom lines should be as straight as possible. Particularly is it desirable that the sheep should be well filled in behind the shoulder. The ribs should be well sprung, there should be a good heart-girth, and the flank should be well let down. The leg-bones of the Southdown should not be too coarse. The hind legs should be "straight."

C. E. C., photo.]
A Weak Ram's Head.

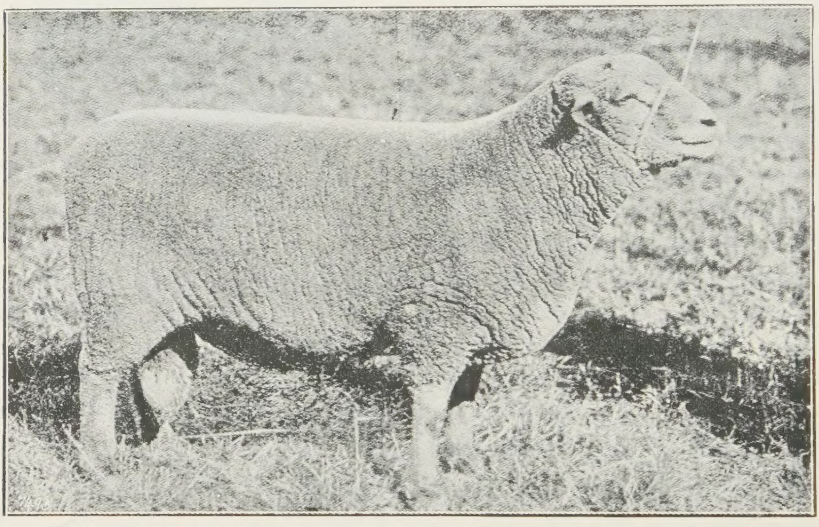
The fleece should be of fine quality and very dense. It should be free from coarse wool on the britch. Dark fibres through the fleece are a detriment to the wool when placed on the market. They generally follow a dark face and dark legs. A dark skin, which is very objectionable, is usually accompanied by dark hairs. The skin should be pink in colour.

Points of Management.

Having been evolved in a country of a hilly nature and of light pastures, the Southdown is a very hardy sheep. To give the best results, however, it should be confined to fairly light country and short, sweet pastures. It will travel well for food, but can be depastured more thickly than other breeds, and stands folding on root crops particularly well. In my experience, if Southdowns are on suitable country they require no hand-feeding in New Zealand, either in winter or in summer, provided there be sufficient grass in the pastures. Where the land is of a damp nature it is well to get the lambs to eat a little dry feed (such as crushed oats) in troughs; this is necessary in order to prevent stomach troubles. Where a pea stubble is available it makes excellent feeding for the young sheep, and nothing equals it for topping off

the Southdown lamb. Every pea that has fallen to the ground is thus recovered.

In the breeding of Southdowns it is a mistake to be introducing fresh blood continually—that is if the flock is really good. Apart from the objection that every new infusion of blood strengthens the tendency to variation there is no surety that every family will nick with success. More disappointment has been caused in the work of breeding by continual crossing of strains than by anything else. Where a change of blood is deemed desirable the safest course to pursue is to send a few selected ewes to a good ram of the strain desired. Thus it can be ascertained whether the strains will nick before the new blood is introduced to the

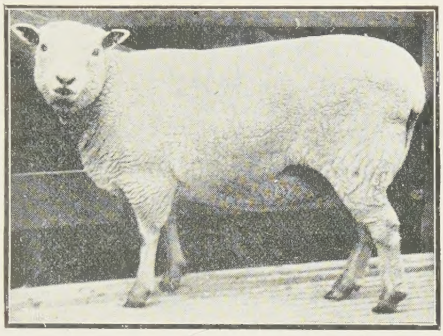


An English Southdown Ram.

whole flock. If the nick is successful any rams secured from the ewes mated with the outside ram may be introduced. Of course, when the cross is unsatisfactory the progeny can be disposed of without the flock being affected.

My practice in breeding is not to put the ewes to the ram until they are two-tooths. I have had, however, as good results from a ram lamb as from one fully matured. One season a well-developed and vigorous ram lamb seven months old was put in with eighty-three ewes, only one failing, and the following spring he scored well in the show-yard. This ram bred well even after he was broken-mouthed.

So far as my experience goes the Southdown gives less trouble at lambing-time than any other breed. I have lost only one Southdown from protrusion of the vagina. Encouraging exercise prior to the lambing and placing ewes on bare pastures is generally advisable; but this should not imply driving the sheep fast, or putting them on to pastures so bare that they will obtain insufficient nutriment.

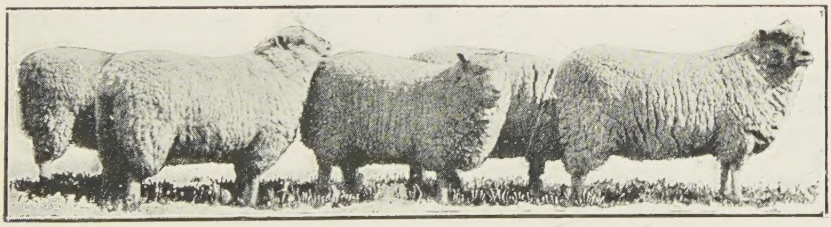


C. E. C., photo.]

A Southdown Ewe.

The Southdown will stand closer stocking than any other breed—a strong factor to be considered in economical production. It is essentially a sheep for the small farmer—that is, for the man who can always keep a close eye on his stock. The wide level back of this breed makes it almost impossible for a sheep in good condition to right itself when cast. It is advisable, therefore, to manage the sheep under such a system that a fairly close watch can be kept upon them.

The tendency of the breed in New Zealand is to increase a little in size and to become more open in the wool. The latter is a tendency which breeders would be well advised to guard against. It is a serious defect, as it is an admitted fact that the loose, open fleece generally accompanies a carcase carrying more fat in proportion to lean than is the case with the carcase covered by a dense fleece. If the Southdown is not superior in flesh-forming and early-maturing qualities to other breeds it will not maintain its present position.



C. E. C., photo.]

Southdown Rams at Ruakura Farm of Instruction.

The breeders of the Southdown should guard at all times against any relaxation in the maintenance of constitution. This is a character which cannot be neglected, for without it the points of the Southdown which appeal to the fat-lamb producer—early maturity and rapid-fattening quality—will quickly be lost. A poor-constitutioned animal will never prove profitable, and is dangerous as a breeder. It will pay to sacrifice everything to this quality.

Never use for breeding purposes a ram or ewe inclined to scour.

If it is necessary to supplement pastures for the stud ewes in lamb, it is the best plan at all times to feed the roots or hay in the field where the sheep are grazing.

New Zealand breeders have every reason to be satisfied with the standard of Southdown being bred in this country. At the present time local farmers visiting the Home-land find it a matter of considerable difficulty to secure sheep of such value that they can be regarded as worth importing to the Dominion to improve local flocks. Several representative authorities have declared that we have just about as good sheep in New Zealand as they have at the present time in England.

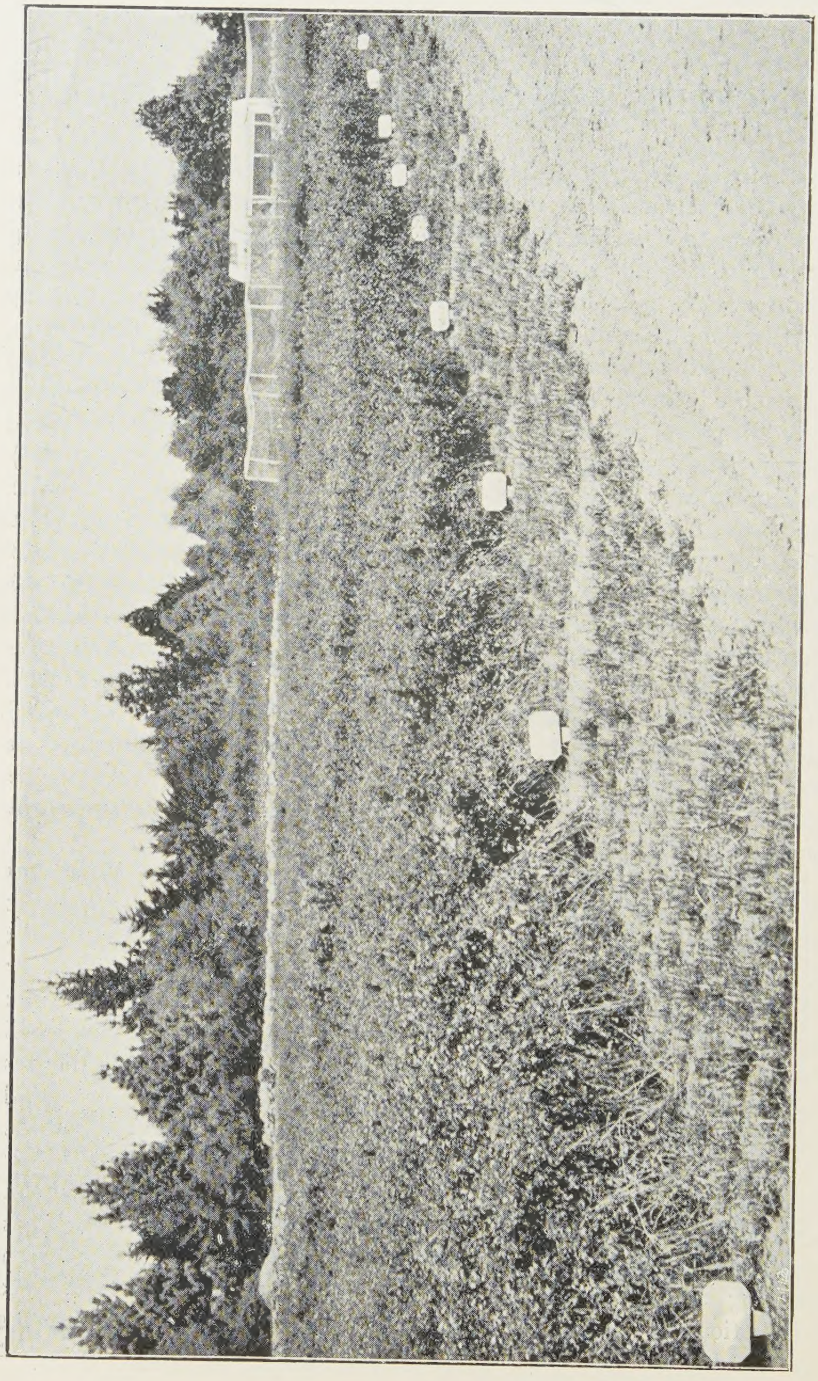
S. B. Taylor, photo.]

In the Month of August at Ruakura Farm of Instruction.

LUCERNE-TESTING WORK AT RUAKURA.

One of the features of the present-day activities of the Ruakura Farm of Instruction is the work of improving acclimatized varieties of lucerne to ascertain the best for local conditions, and of securing by selection and control strains of greater productivity and constitution. It is only a few years since the work of ascertaining whether lucerne would grow successfully at Ruakura was undertaken, but the experimentation stage has passed. Lucerne is thriving under the several extreme variations to be found on the property —in the rich humus soil of the nursery, on the poor reclaimed swamp fields (an unkind pipeclay soil resting on an iron pan), and on the highest portion of the low-lying hills which intersect the farm. To see the lucerne plots and fields at Ruakura is at once to appreciate the enthusiasm of the Manager and his staff for the great fodder plant, and to realize the possibilities in this country of intensive farming with such a plant having a suitable environment over the greater area of the Dominion. Convinced that lucerne will soon take a permanent place in New Zealand farm economy, the Manager of the farm, Mr. Primrose McConnell, and the plant-breeding officer, Mr. A. W. Green, are intent on an active campaign in selecting and breeding improved types of the plant for New Zealand conditions, and in furthering lucerne-growing among farmers coming under their influence.

A section of the nursery at the Ruakura Farm of Instruction is exclusively devoted to the testing of the leading varieties of lucerne, as well as to the important work of selecting plants exhibiting improved characters or resistance to disease. There are seventeen plots in all, and sixteen varieties are under observation. There are eighteen type-improvement second-year trials, while twenty-five more trials are in their first year. Many of the tests have been in progress for five years, and valuable work has already been accomplished. When the single-head selections were initiated four years ago fifty individual plants of the Peruvian variety were selected for robustness of type. Of these, forty-nine were finally eliminated. From the single outstanding plant retained there are now over 1,200 plants isolated for comparative purposes (and growing alongside established commercial varieties) and for seed-production. Although this selection is an undoubted improvement on the original type, it cannot be claimed to exhibit any superiority



The Lucerne-testing Plots at Ruakura

C. E. Cuming, photo.]

over Hunter River in regard to productiveness, though less susceptible to leaf-spot; but at the time the testing-work was commenced the Peruvian was the only variety being grown at the farm.

The Peruvian variety is rather subject to leaf-spot, but by selecting plants found to be free of this trouble there has been established a strain which is a vast improvement in this respect on the original type. The comparison at the present time between the original plot, with its many patches of affected foliage and generally poor leafage, and the selected strain, immediately alongside, is most striking. The latter shows a splendid vigorous growth. These two plots afford a very good idea of the great possibilities in plant-selection work, and have proved an interesting subject of study to many visiting farmers. The selected strain has a smaller leaf and a thinner stem, the latter character being of some importance from a haymaking viewpoint, as it implies a minimum of fibrous material.

A further endeavour to obtain an improved strain of the colonial (Marlborough) variety, by means of single-plant selections, is giving encouraging results. With the six plants obtained from one head of seed two were found to be absolutely free of leaf-spot, and were particularly vigorous; thus only two plants out of six were found to possess the desired character. These two plants are to be protected from cross-pollination, with the object of securing a pure improved type.

In testing lucerne varieties it is quite impossible to obtain any accurate idea of their respective productiveness by cutting the plots at the one time. Each plot must be cut and weighed immediately it has reached its best feeding-stage. For instance, Peruvian and Arabian mature much more rapidly than other varieties tested, and consequently will give more cuts during the season. Thus the heavier yields of some other varieties may be counterbalanced when the whole season's returns are estimated.

A study of the many single-plant selections gives a fair idea of the great variation within the one variety and the consequent possibilities in plant-breeding intelligently directed. It may be remarked that leaf-spot gives little trouble when the lucerne-plant is frequently cut or fairly closely grazed. The tendency, however, probably indicates a weakness in constitution, a tendency which if eliminated by breeding only from resistant types should lead to the securing of a race of improved vigour and productiveness. It has been noticed in this season of general susceptibility to blight and fungoid disease that leaf-spot has attacked even the

stems of lucerne varieties prone to attack, a fact which emphasizes the necessity of only using types resistant to disease. When it is considered that single-plant selection—choosing by keen observation plants exhibiting some superior quality, not the intricate and more problematical "plant-breeding" system—is a reliable key to plant-improvement (just as it has been for a century or more in the animal kingdom), there is every encouragement for even the farmer to take up this interesting and profitable study. Obviously, if the work of expert plant-breeders were supplemented by individual observers throughout the Dominion, the good results which would inevitably follow in the train of these united efforts would have a vast influence in raising the productive value of our agricultural plants. Already, it is gratifying to know, many farmers who interest themselves in the plant-selection work at Ruakura are co-operating in forwarding to Mr. Green exceptional plants which come under their observation, realizing that though they cannot give the time and close application demanded to attain the best results they can at least render good service by co-operating with the specialist.

"Knowledge is not a gift of bare experience, nor even made solely out of experience." The creative activity of the mind is an important essential in its derivation. We report facts, and we let them speak for themselves. But as we investigate we inevitably interpret the results as well as record them. Research leads outside the field of human experience and beyond experiment, and through constructive reasoning extends the boundaries of knowledge.—*U.S.A. Experiment Station Record.*

It has been shown in this country that the most effective means of securing the application of new methods of agricultural practice on a large scale is to have the new methods actually demonstrated on the farm, and to have advice and instructions given by the personal association of experts with the farmers. In order to enable the State Agricultural Colleges to organize their work more thoroughly along this line, and to extend it greatly in co-operation with this Department, a Bill for co-operative demonstration work has passed the House of Representatives this week, and will be acted on in the Senate within a few days.—*B. O. Galloway, Acting-Secretary, U.S.A. Department of Agriculture, in a communication to F. S. Pope, Secretary of Agriculture, Industries, and Commerce.*

"THE long branching roots of lucerne penetrate far down, push and crowd the earth this way and that, and thus constitute a gigantic subsoiler. These become an immense magazine of fertility. As soon as cut they begin to decay, and liberate the vast reservoir of fertilizing matter below the plough, to be drawn upon by other crops for years to come."

WHITE-PINE.

SHOULD THE EXPORTATION BE WHOLLY OR PARTIALLY PROHIBITED?

The question of the increasing demand for white-pine in connection with the butter industry and the suggestion that the export of this timber should be restricted was dealt with by the Royal Commission on Forestry, extracts from the report of which have already appeared in the *Journal*. The Commission reported on the white-pine problem as follows:—

In order to deal satisfactorily with the above important subject, the matter must be approached from several points of view, two of the most important being a consideration of the value for farming purposes of land on which the white-pine grows, and whether it be feasible to find another timber suitable for butter-boxes, and, we may add, cheese-crates, when the supply of the above timber is exhausted.

The white-pine, or kahikatea (*Podocarpus dacrydioides*), either forms pure forests of that tree alone on low-lying swampy ground so far as tall trees are concerned, or grows in much lesser quantity mixed here and there with the other trees of a New Zealand pine forest. In the pure white-pine forest the yield may occasionally exceed 80,000 superficial feet per acre, though it is generally less than half that amount. In the mixed forest the number of white-pine trees varies greatly, but the yield is almost invariably less than that of the rimu (*Dacrydium cupressinum*), with which it is associated.

As is well known, the soil of the white-pine swamps, when drained and the trees removed, forms the richest of agricultural land, which when grassed is of extreme value for dairy farms. The mixed forest, too, where the white-pine is a subordinate tree, is frequently situated on good agricultural land. It has earlier on been laid down in this report as a general principle that no forest land which is suitable for farm lands, except it is required for a scenic or climatic reserve, should be permitted to remain under forest if it can be occupied and resided upon in reasonably limited areas. Since no land is more suitable for occupation than that of the white-pine swamps when drained, their value in this regard is a strong plea in favour of the removal of the trees forthwith. The matter as to a substitute for white-pine for butter-boxes is a somewhat difficult question, but it does not seem an insuperable difficulty. The use of white-pine for butter-boxes is confined to New Zealand and Australia, whereas in other butter-producing countries, such as Canada, Siberia, and Denmark, other timbers are made use of. It is true that Canadian and Siberian butter is of a lower grade than that of New Zealand, but this is due not to the superiority of white-pine in not tainting the butter, but

rather that the butter itself is of inferior quality. The above view is supported by the fact that, although both Victorian and New Zealand butter is packed in white-pine boxes, the former brings a lower price in the English market than does the latter. As for the timbers used for the conveyance of butter in Siberia, Canada, and Denmark respectively, we have no evidence as to what is used in the first-named country, but in the two latter, according to Mr. Cuddie, they are spruce (*Picea alba*) and European beech (*Fagus sylvatica*). The use of beech timber for butter-boxes is interesting, as it suggests a new application for the New Zealand beeches.

In order to approach more closely the question of a substitute for white-pine, the characteristics of a first-class timber for butter-box purposes must be considered. These are: (1.) Non-liability to impart a taste or odour to the butter. This quality is lacking to some extent in all classes of wood, especially if not seasoned. It can be overcome in some cases by first paraffining the wood and, in addition, inserting two thicknesses of parchment paper, which course is recommended by the Dairy Division of the Agricultural Department, even in the case of white-pine. (2.) The wood should be in one piece—at least, for the ends of the boxes. This, so far as the sides are concerned, is not essential, and jointed boxes of white-pine are being made use of at the present time. Should dovetailing be discountenanced, then, as the oblong box at present in vogue measures 14½ in. by 11½ in. by 10¼ in., trees less than 1½ ft. in mean diameter would be unsuitable. (3.) A light timber is to be preferred, so that the box should not exceed 10½ lb. or 11 lb. in weight. In this regard every additional pound must add to the cost of carriage to the railway, and were the boxes to be much increased in weight probably the freight for sea carriage would be increased. (4.) The wood should be light in colour, so that the brand will show well and the package be attractive in appearance. White-pine fulfils the above condition, though the wood is more or less yellowish-white. (5.) The wood should be easy to nail, and should hold the nails securely. As it is essential that all butter-box wood should be thoroughly seasoned, the danger of splitting when nailed must also be taken into account. The wood of seasoned *Pinus radiata* is especially good from this standpoint.

Up to the present white-pine has answered so admirably both for the packing of butter and cheese that there has been but little trial made of substitutes. There is information alone on this head regarding poplar, *Pinus radiata*, and tawa (*Beilschmiedia tawa*). Poplar, according to Mr. Cuddie, will probably be a satisfactory substitute. Both butter and cheese have been so packed, so far as non-tainting is concerned, with good results. The timber fulfils all the other requisites of a butter-box.

Pinus radiata, according to an experiment conducted by Mr. M. Murphy, of Christchurch, some time ago, was used successfully for the packing of butter, the contents of the case being free from taint after being in the cool chamber, according to a letter he sent your Commissioners, "for the usual time occupied in transport to England" and "packed in the usual way." Tawa was largely used for the packing of butter in the earliest days of the industry, but at that time not nearly the same care was exercised as at present.

In order to gain additional knowledge regarding the suitability of timbers not used as yet for the packing of butter, we, early on in our Commission, with

the co-operation of the Agricultural Department, the Leyland-O'Brien Timber Company of Auckland, and the Auckland Dairy Association, to all of whom we are much indebted, caused small boxes to be constructed, each with a capacity for 3 lb. of butter, from the following timbers: Tawa, taraire, poplar, and *Pinus radiata*. The interesting report of the Government Grader upon this experiment may be seen in the Appendix C. Suffice it here to say that the tests, so far as they went, were most encouraging, all the butter remaining in excellent condition and free from taint.

The quantity of *Pinus radiata* and poplar in New Zealand available for butter-boxes, &c., is extremely small, and it would be a considerable number of years before a reasonable supply were available if the greatly extended planting of these trees as recommended by us in Part II of this report be followed.

As for tawa, there is at present a good deal in certain of the indigenous forests of the North Island, but in many places it occupies land that will soon be taken up for settlement, where, as there is little other millable timber, it will be burned, and not converted. Nor can tawa timber compete with white-pine under present conditions. How long the white-pine will last at the present rate of consumption we cannot say, since we possess no reliable data as to the area occupied by that tree. There are considerable forests in South Westland which it will not pay to convert for many years to come, owing to their distance from a seaport or railway. To sum up, the substitutes for white-pine must come from abroad until such time as our own plantations are available. We saw in Dunedin an imported butter-box made of Norway spruce (*Abies excelsa*), which seemed suitable and which is supplied at a lower cost than that of white-pine. We have also seen boxes made from wood-pulp. Then there are the timbers used in Canada and Siberia for packing butter, which should answer equally well here, and which could be imported probably for many years to come.

Bearing all the above facts in mind, we are of opinion that a substitute for white-pine can be found, first of all in an imported article, and later in timber grown in New Zealand. The following matters may be briefly dealt with which concern our final decision:—

1. White-pine, at one time used as a building-timber in New Zealand, has fallen into disrepute through the action of the larva of a beetle which brings about the so-called "dry-rot." Consequently the timber is now used solely in the Dominion for butter-boxes, cheese-crates, fruit-cases, and packing-material generally. But in Australia the timber is used not for boxes only, but for other purposes; so that the whole of the contents of the log, the waste excluded, can be sold to the Commonwealth. Were such exportation to be forbidden the West Coast Timber Company shows that 60 per cent. of the log-output would remain in the sawmiller's hands, and the price of box-timber would be raised to such a price as to allow the above 60 per cent. to be rejected.

2. Were there to be a restriction on the export of white-pine, then the sawmiller would cease to convert the white-pine trees in his rimu forest, and they would remain only to be eventually burnt in the course of settlement.

3. By arrangement with Australia our white-pine timber is admitted free. We get much valuable hardwood timber from Australia, and were the exporting

of our white-pine to be prohibited Australia might decline to let us import her hardwoods. After a careful consideration of all the points dealt with above, we recommend that there should be no restriction whatsoever imposed upon the exportation of white-pine. Further, in view of the great importance to the State of finding and providing a substitute for white-pine for the packing of butter, we consider it advisable that the Dairy-produce Division of the Agricultural Department should conduct an exhaustive series of experiments with regard to the capabilities of various timbers for butter-boxes, especially *Pinus radiata*, *P. Laricio*, the various kinds of poplar, Oregon pine (*Pseudotsuga Douglasii*), the various species of New Zealand beech, tawa, and taraire. Regarding such experiments the following may be stated: (1.) Each experiment must be on a sufficient scale to preclude any experimental error. (2.) All timber must be properly seasoned. (3.) The ages of all the exotic timbers should be ascertained. (4.) Each set of experiments must be conducted with an exactly similar dairy-product. This also applies to the control of white-pine boxes. Grading must take place before packing and when unpacked. (5.) If *Pinus radiata* is a success, that tree would naturally be recommended on account of its afforestation qualities as detailed in Part II of this report. There should be experiments with trees of that species of different ages, and also from timber seasoned both before and after milling, as well as from timber milled when green.

S. B. Taylor, photo.] Haymaking at Weraroa Experimental Farm.

The British live-stock breeder has for long been searching to discover a "feed" combining a high percentage of flesh-making properties with a uniform quality and a moderate cost. In this respect, until quite recently, he was not as fortunate as his American cousin or as stock-breeders on the Continent, for it was in America and on the Continent that alfalfa (lucerne) was first tested and appreciated as an animal ration. To-day this same "feed" is claimed to be the best stock-raising medium on the market.—*Agricultural Gazette, London.*

SPROUTING OF SEED POTATOES.

A. W. Green.

The system of sprouting seed potatoes in boxes previous to planting has become the recognized procedure if time is to be economized and the best results are to be attained. To those who grow for early market or for the sale of seed the method cannot be too highly recommended. It will not pay to overlook the advantages which may be gained by sprouting where growing for the open market is the object in view. The first new potatoes of the season invariably meet with a ready sale at high rates, but high

C. E. Cuming, photo.]

The Sprouting-box used at Ruakura.

rates do not last, and it is remarkable how rapidly they decline with the increase in supplies. This season has afforded a good illustration on Auckland markets of the low rates for second earlies.

It may be well to point out several of the advantages to be gained by using sprouted sets in preference to unsprouted sets.

(1.) Sprouted seed planted two weeks later than unsprouted will come above ground on the same date.

(2.) During unfavourable weather planting may be delayed longer. This will also lessen the risk from late frosts.

(3.) The number of sets which rot immediately after planting are reduced to a minimum. Seldom does a sprouted set rot

before the sprout itself has taken sufficient root to form a plant. As a result of this there are fewer blanks in the rows.

(4.) The cultivator can be worked between the rows a fortnight earlier — an important point, especially during early spring when weeds are difficult to control.

(5.) The crop matures earlier, consequently it can be dug earlier.

(6.) The time during which the potatoes are in the ground being considerably lessened, the chances of their becoming affected with disease is proportionately lessened.

(7.) Increase of crop: This has been proved repeatedly. A report of the Department of Agriculture and Technical Instruction for Ireland states that over a period of five years tests to the number of 271 were conducted with sprouted *versus* unsprouted seed. The results gave an increased yield due to sprouting of 2 tons 3 cwt. per statute acre. Conditions of soil, manuring,

C. Perry, photo.]

Strong-eyed Tubers, any of which would make Good Sets.

cultivation, and variety of potato planted were identical in every test.

Those who grow for seed will find it almost compulsory to sprout all tubers previously. It is the simplest and most reliable way to select good strong-growing sets, as well as to keep strains free from impurities.

Any tubers producing weak or thread eyes can readily be detected and removed. Rogues will be shown up by their differently coloured sprouts. Seldom do the colours of the young shoots of any two varieties agree; in fact, sprout-colours are a decided assistance in the identification of varieties. Take the condition of the potatoes when stored in pits for seed purposes. They form long white sprouts two or three months before planting-time, and it is found necessary to turn them at least twice, rubbing off the

sprouts at each turning. Disbudding of this nature certainly reduces the vitality of the tuber and weakens the strain. By the boxing system the first and strongest sprout from each tuber is preserved, and when planted gives the healthiest plant and the heaviest return.

The sooner seed potatoes are placed into boxes after being dug the better, but it is not urgent until the buds begin to swell. As time is precious when lifting the crop, those to be reserved for seed may simply be poured into the boxes and sorted out later. A wet day is a suitable time for this work. Place by hand with the rose end upwards: this gives every set an equal amount of light and air, and facilitates rogueing. An even-shaped egg-sized seed should be chosen, uneven ones discarded.

The boxes in use at Ruakura are of two makes, one with a cross-bar for a handle, and the other as illustrated, with a hole

C. Perry, photo.]

Weak-eyed Potatoes—Should be discarded.

cut out of each end, which serves the same purpose. The ends are 3 in. deeper than the sides, which allows of air-space between each box when piled one above another.

The boards in the botton of the box are nailed on so as to leave a $\frac{1}{2}$ in. space between each. These spaces allow air-currents to pass between the tubers. Each box holds about 25 lb. when packed. Store the boxes in an open shed so that the potatoes may have plenty of light and air. At this farm a shed is erected suitable for the storing of potatoes. The roof is of ruberoid, and the sides merely small-mesh wire netting, to keep out rats and birds. It is built under the shelter of trees, which prevents rain from beating in at the sides and lessens the danger of frosts. The height of the roof-ridge is 8 ft. from the ground, and the width is 8 ft. A passage-way is left up the

centre, boxes being stacked on either side next to the wire netting so as to obtain as much light as possible. If shed-room is not available the boxes may be stacked under the shade of pine-trees. A little rain does no harm so long as frost is kept off.

It will be noticed that boxed seed soon turns green by the action of sunlight. The tubers remain firm and do not sprout until well into the winter or early spring. The buds then begin to swell, and after bursting form short, thick, close-jointed, stubby sprouts. Darkness weakens and lengthens the sprouts. When the buds first burst their true colours can be seen, particularly in the

C. Perry, photo.]

Uneven Shapes—Should not be planted.

corners of the boxes where light has not penetrated to the same extent. Shortly afterwards the light turns them green.

Too much moisture is detrimental after the sprouts have developed, as it induces the formation of adventitious roots at the base of each bud. There is little danger of these stubby sprouts being broken off during planting operations if a little care is taken in the handling. Plant directly from the box, and always walk backwards when dropping the sets, so as not to tread on them.

Live-stock at the Panama Pacific International Exhibition, 1915.—An exhibition of live-stock will be held in connection with the Panama Pacific International Exhibition at San Francisco, and will last throughout the period of the main Exhibition—viz., from 20th February to 4th December, 1915. A sum exceeding £90,000 has been set aside for premiums and money prizes.—*Journal of the British Board of Agriculture.*

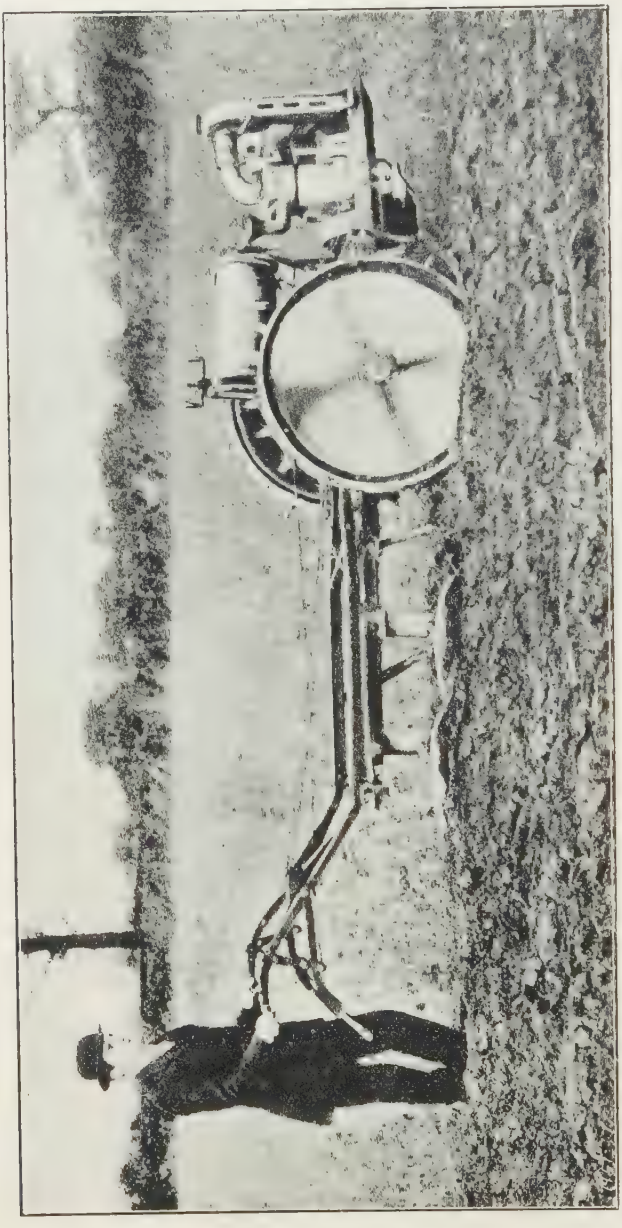
A PRACTICAL MOTOR-PLOUGH.

In the April issue of last year of this *Journal* there appeared an article from the pen of Mr. E. Clifton on the subject of motor-traction on the farm. Prominence was there given to an English invention which it was thought would specially appeal to readers of the *Journal*—a self-contained 4 horse-power motor plough and cultivator, suitable for the farmer, the fruitgrower, and the gardener. When described by Mr. Clifton it was just out of the inventor's hands. Since then the noted firm of British plough-makers, Messrs. John Fowler and Co. (Limited), of Leeds, have taken it up. Under the direction of the inventor, Mr. A. Wyles (a mechanic who took up gardening for the benefit of his health), the Leeds firm has spent a year in testing the Wyles motor-plough and in perfecting some important details, until to-day, according to the *Commercial Motor*, the machine can be put freely and in absolute confidence upon the market.

In a carefully measured test in September of last year the single-furrow type ploughed 1·6 acres to a depth of 6 in. in eight hours, with a consumption of benzole of $3\frac{3}{4}$ gallons. The next month a test was carried out with the double-furrow type. In eight hours 2·8 acres was ploughed to a depth of 5 in., the consumption of benzole per acre being 3 gallons 7 pints. Reporting on these trials and on a close investigation of the agrimotor and its work, a writer in the *Commercial Motor* says,—

"Careful calculation on the basis of the second test showed that it was quite safe to quote the outside cost, including labour, depreciation, maintenance, and repair, with a Wyles two-furrow plough, under normal conditions, at 4s. 6d. per acre—a truly remarkable feat, and one which we imagine it would be hard to excel with any other class of mechanical plant.

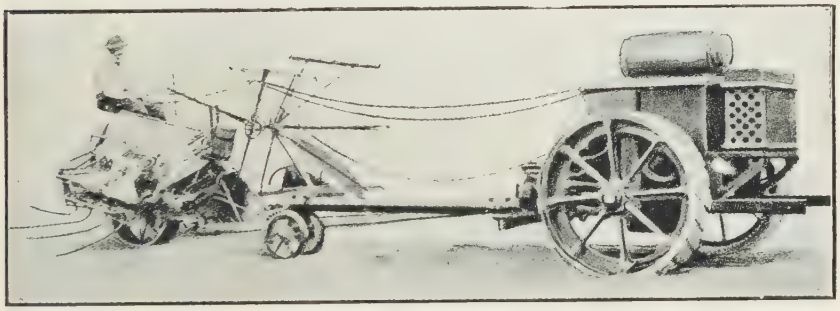
"The single-furrow plough can be set to cut any width from 8 in. to 14 in.; the double-furrow may be varied in total width from 16 in. to 22 in. The depth ploughed, of course, depends on the nature of the soil and upon its condition, as well as upon the ability of the engine to take the work. When not in use in the fields the engine can be used for all kinds of belt-driving, such as pumping, milling, grinding, chaffcutting, &c.; in fact, in wet or fine weather the machine need never be idle. It is only 3 ft. in



The Latest Model of the Wyles Motor-plough.

height over all, and 2 ft. 4 in. in width, so that it is especially suitable in cases where it is impossible, or, at least, unsatisfactory, to employ horses; and notably is this the case in between the trees of orchards, in vineyards, or in hop-gardens, and generally for cultivating between rows of growing crops. The total weight of the machine as it now stands is about 13 cwt. fitted as a one-furrow-machine, and 14 cwt. as a two-furrow machine, and the price complete is only £130.

"In conclusion, we may recapitulate the advantages of this class of small implement. Primarily, there is the fact of reduction in dead-weight per furrow. The tractor simply, of course, has its own dead-weight to contend with, a fact that tells us its tale in respect of petrol-consumption as well as in the detrimental effect it has of packing the land. The ability to get to land where the surface would not stand heavy weights, and the possibility of splitting fields in the most economical manner and ploughing right up to and including the headlands, are other advantages. So long as there is daylight, or even moonlight, the motor can be kept at it. There is no preliminary feeding, no Sunday attention, no bedding down. When it is not earning money it is not costing it."



A New American Motor—The Detroit Motor-horse.

There is no profession or business that does not need the stimulating and encouraging influence of knowledge gained from experiment.

The difference between motor-power and horse-power on the farm is that when a traction quits work its expense ends, and when a horse quits work its expense begins. A hay famine has no terrors for the power farmer.—*The American Blacksmith.*

BLIGHT-RESISTANCE IN POTATOES.

W. S. Hill, B.Agric.

In the potato experimental plots at the Moumahaki Experimental Farm this season a good demonstration is provided of the difference in the resistance to Irish blight of two varieties in this environment. As will be seen from the accompanying photograph, Gamekeeper escaped the blight, while Up-to-Date in the immediate

C. E. Cuming, photo.]

Rows of Up-to-Date Potatoes in the Foreground, and Rows of Gamekeeper at the Back.

proximity was very badly affected. The Gamekeeper potato is a prolific cropper at Moumahaki, and thrives in the loose soil and moist climate characteristic of the farm. This variety produces a large number of small tubers in a dry season, and also has in many cases what might be termed a "continuation" tuber, which it is hoped at Moumahaki to eliminate by selection. Gamekeepers exhibit a high degree of resistance to disease, and were they

planted still further apart than shown—say, in 36 in. drills and with 30 in. between the sets — the attacks of blight might be further reduced. The Up-to-Date is a well-known heavy cropper, and produces a smaller number of large shapely tubers per root. The ravages of blight, as shown in the foreground of the picture, render this variety rather unsuited to the district.

THE CABBAGE MOTH OR CATERPILLAR:

A METHOD OF PREVENTION.

W. C. Berridge.

The attempt to raise cabbage and cauliflower plants at this time of the year generally fails on account of the ravages of the cabbage grub or caterpillar, a small light-green caterpillar which, if disturbed, lowers itself to the ground by a strand spun by the insect itself. By spraying every few days with some strong-smelling liquid, like tar-water or diluted carbolic acid, it is true, plants can be raised, but this requires constant watchfulness, as failure to keep the plant covered, or the washing-off of the spray by heavy rains, exposes it to the attacks of the insects.

A simpler remedy has been discovered, based on the fact that the moth which lays the eggs only flies a few feet from the ground. If cabbage or cauliflower seed is sown in flats or boxes, and these elevated 6 ft. to 7 ft. from the ground, the moths do not appear to be able to discover the plants, as instinct teaches them not to expect to find plants of that description at such a height. Care must be taken to provide only a slender support for the boxes, because if a solid support is afforded the moths will occasionally follow up the solid surface until they find the plants. Some years ago I erected a staging of 2 in. by 2 in. timber, 7 ft. high, and used this successfully for a couple of seasons to raise cauliflower-plants on. A hedge of passion-fruit vines was planted alongside, and the third year this was 4 ft. high, when a few moths found their way to the boxes and injured the cauliflower-plants for the first time. The fourth year the passion-vines were almost on a level with the seed-boxes, and we were then unable to raise any plants, owing to the ravages of the grub. The next year's experience was exactly the same. When, however,

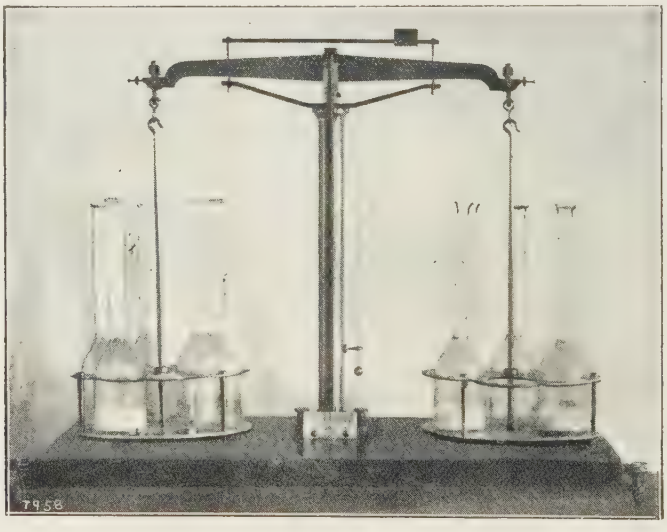
another staging was erected away from the hedge the plants were not attacked.

This method has been tried several times, and always with the same result. The points to be observed are to make the staging high enough, and to keep it isolated from other plants or buildings. Of course, it requires care to keep the plants watered and not allow them to dry out, but full compensation is gained by securing strong plants ready for transplanting when other growers are about sowing their seeds.

The labour of watering can be minimized by suspending above the box of plants a kerosene-tin with a minute hole in the bottom, and inserting a piece of sacking or string in this to act as a wick. This will keep the boxes watered with the least care.

CREAM-TESTING SCALE.

The latest type of scale for weighing samples of cream to be tested by the Babcock method. Twelve cream-testing bottles can be balanced at once. The scale is fitted with agate points, the bottle-



holders revolve in order to facilitate the filling of the bottles without removal, and generally the arrangement is a considerable improvement on scales of this class usually sold. The reliability and durability of the apparatus also show an advance in manufacture.

ENSILAGE.

THE SILO FORM.

W. Dibble.

Although the stack form of silage provides an admirable means of conserving forage, especially when prepared in this form on a large scale, the silo presents several undeniable advantages, particularly to the small farmer. One of the great drawbacks to the stack form is removed by the silo—the natural waste where a method of conservation which implies the absolute exclusion of air is adopted in the open and without the assistance of any artificial protection. In a well-built and well-weighted stack the material at the ends and sides for at least 5 in. is comparatively useless, while in a carelessly built stack the waste matter may extend from 8 in. to 10 in. In a properly filled silo, where the material is chaffed and the sides well tramped, the waste is practically nil.

It may well be emphasized here that it is the pressure on the sides, in the stack as well as in the silo, that is important; the centre will look after itself. The silo situated alongside a good roadway enables the material to be carted to any position without injury to the land, which is one of the drawbacks to the stack system. In holding silage over a long period there is less loss in the silo than in a stack, for in the former case practically no deterioration takes place, while less land is occupied. Generally, the silo is more economical and more convenient, while it presents the decided advantage of providing a higher class of feeding-material. With the development of more intensive farming the silo will, I am convinced, appeal to an increasing number of farmers in this country.

The Steel Silo, or Self-stacker.

A form of silo which is becoming very popular in the Commonwealth of Australia, and which is being introduced to the Shannon district (by Mr. M. Moynihan) and the Levin district (by the Weraroa Experimental Farm), is known as the "portable all-steel silo." It is constructed of semicircular sections of galvanized sheet iron, measuring 5 ft. 10½ in. by 3 ft., and comprising three sheets of

iron riveted together and framed in iron supports, which are flanged to enable the sections to be bolted together. This silo can be used for the making of a stack from either uncut or cut material, in a circular form. The steel framework may be removed after uncut silage has settled down—say, in about two months' time—or be used as a permanent silo. Where used for merely shaping a stack the silo may subsequently, if desired, be fitted up near the stock buildings or homestead and used for the storage of grain.

The two all-steel silos which have been imported are being used as permanent silos, and, instead of being placed on blocks of timber, as is done in Australia, concrete foundations have been substituted. Mr. Moynihan's silo has been erected in a cavity in the face of a road-cutting on the farm, to facilitate filling operations when the material is not chaffed. The silo has, however, been erected on the level at Weraroa, where the material is being chaffed and the silo filled by means of an American cutter and blower.

The most important consideration in erecting a silo in a permanent position—and this applies to all descriptions of silos—is to construct a proper foundation, airtight and yet providing the necessary drainage, cleaning the interior when this is desirable.

In making the foundations of these silos the concrete base was built 8 in. below and 8 in. above the ground (above the ground-level to prevent any surface water soaking in), the interior being scooped out in the form of a shallow basin, with a groove from the centre to a 3 in. tile outlet through the bottom of the concrete base. This, of course, is plugged up when not being used for cleaning purposes. The concrete foundation is 7 in. wide, and the bottom of the silo is covered with concrete from 2 in. to 3 in. thick. This supposes that the earth is of a solid character, as where the soil is of a loose nature some rough filling would have to be put in to carry the concrete flooring. The concrete was made with one part of cement to six of gravel. Bolts, specially made (10 in. long and $\frac{3}{8}$ in. thick) to hold the base of the first sections of the silo, were embedded in the concrete, this bottom tier being placed in position on the top of the concrete mould, resting on small pieces of wood laid across the mould. The bolts were thus placed in a position in the bottom of the first tier of steel plates when the concrete was poured in the mould. After the concrete was allowed to set thoroughly a double piece of felting was placed on it, the supports taken away, and the tier of plates dropped into their permanent position and bolted home. Where the steel silo is being erected in a position where it will be affected by wind the first tier will have to be steadied by guy ropes or wires when the concrete is settled;

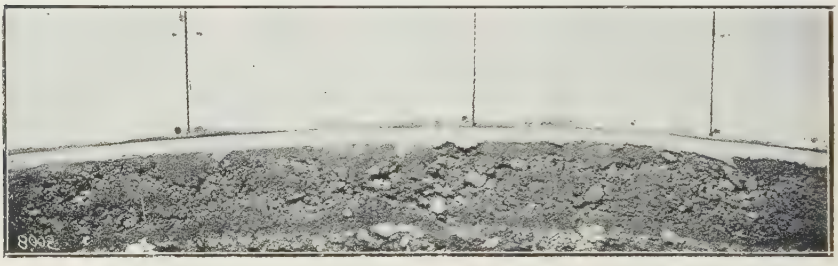
S. B. Taylor, photo.]

Erecting the All-steel Silo at Mr. Moynihan's Farm.

Placing the second tier of iron sections in position.

and even in such a position it must be made stable in the same manner when finally erected, especially for the safety of the structure when empty.

The all-steel silo, or self-stacker, will appeal to the farmer who has no experience of making silage, for, once the sixteen sheets (two tiers of eight sheets each) of a 75-ton silo are in position, the mere filling or making of the silage is a very easy matter: indeed, the making of ensilage by this means is simplicity itself. All that requires to be done is to fill to a height of about 6 ft. the first day, and allow this to reach 125° F. for maize, sorghum, &c., and 135° for grasses, clovers, lucerne, &c. Do not attempt to level or tramp the sides until the heat has been developed. Then level by placing the heated material from the centre around the sides, and well tramp, especially at the edges. After this, 3 ft. daily can be



S. B. Taylor, photo.]

The Concrete Foundation, viewed from within the Silo.

added, the reaching of the desired temperature being necessary with each layer before another is added, taking care all the time that the sides are well tramped down.

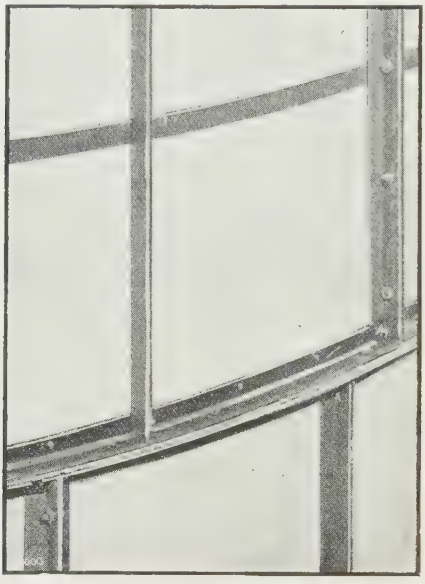
When the filling of the silo is completed it is necessary to put a layer of some material on top to exclude the air. A layer of chaff, or roughage cut into long lengths, this being watered to encourage it to cake, will do admirably. When the ensilage has subsequently subsided—say, after two months—and it is desired to utilize another crop for the silo, the "top" referred to should be removed. When the second filling is completed another fresh top should be put on.

A cover in the form of a hip roof is usually employed for the movable all-steel silo, but I believe a stronger and more effective roof could be made from iron shaped in a circular form and bolted on.

In chaffing material for a silo it should not be cut longer than $\frac{1}{2}$ in. In growing maize for silage the crop should be planted in

Filling the Portable All-steel Silo at the Weraroa Experimental Farm by Means of an American Cutter and Blower.

drills from 24 in. to 27 in. apart. Then inter-cultivation would be possible, the individual plants would be stronger, and thus able to withstand the effects of adverse wind, and the sun, having an opportunity to reach the plants, would bring them to quicker and better maturity. Very often where the maize is broadcasted, or even sown in close drills, only the outside plants develop sufficiently to form cobs. The maize should be cut for silage when the cobs have fully developed but have not ripened. Generally, material for silage should be cut just before it has reached full maturity.



S. B. Taylor, photo.]

How the Sections are bolted together.

While maize furnishes one of the cheapest forms of silage known, and lucerne, which requires the admixture of a little dry material when it is cut in the early spring, makes a most valuable silage, there are other crops from which excellent silage can be made, such as sorghum, oats and tares, barley and tares. While silage can be made from practically anything, it is well to remember that the quality of the silage is in direct ratio to the food-value of the material from which it has been made.

The health of a cow depends on fresh air, light, a clean hide and good feed. To provide this is your first duty, and the next is to find out if she pays you for your trouble.—*Hansen's Dairy Bulletin.*

For the first time in history a competition will take place this year at the Royal Show of England for milking Herefords. The prize-money is being provided by the Hereford Herd-book Society. Hereford milk is naturally rich, and the milking-capacity of certain individual cows in New Zealand herds indicates that success would attend an endeavour to advance by proper selection and management the milking-power of this breed.

SILVER-BEET.

AN EXPERIMENT CONDUCTED AT THE SUNNYSIDE MENTAL HOSPITAL.

A. Macpherson.

In order to determine whether silver-beet would prove a suitable feeding-off crop for dairy stock as a substitute for the crops, supplementary to pasture, which have to be cut and carted out at a considerable expenditure of time and labour, an experiment is being conducted at the Sunnyside Mental Hospital, Christchurch, by the Medical Superintendent, Dr. Gow.

An area of three-quarters of an acre was sown on the 14th October, 1913, the variety planted being the plain, pale-green leafed, with broad, clear-white, and thick midrib. On the 18th February, 1914, prior to being fed off by milch-cows, a representative area of the whole crop was cut and weighed by an officer of the Fields and Experimental Farms Division of the Department, the approximate yield being at the rate of 31·73 tons per acre.

The following report in connection with the feeding-off of the crop has been submitted by Dr. Gow:—

"The beet was sown in ground which had been top-dressed with farmyard manure after a crop of mangels. The soil was a medium loam on a clay subsoil, and received thorough cultivation. Seed was drilled in on the flat in rows 14 in. apart. Subsequently it was reckoned that the rows were too close, and every second one was hoed up, thus leaving the rows 28 in. apart. There was a good strike, and the plants were thinned out the same distance apart in the rows as mangels.

"The experiment was in the direction of ascertaining whether milch-cows could be turned on to graze the crop economically and without injuring the root system and subsequent growths of the plant, with the idea, if successful, of saving the cost of cutting and carting a crop to be fed to cows in another field.

"Twenty heavy Shorthorn milch-cows were fed on the silver-beet two hours in the morning and an hour and a half in the afternoon for twelve days — this on three-quarters of an acre of ground. During the rest of the day and night they were on a dry well-grazed

pasture. They ate the beet greedily, did not scour, and apparently have done no damage to the roots, as a fresh crop of leaves began to shoot away immediately the cows were moved on to a fresh break. These cows had previously been pastured on good red clover and Italian rye-grass. It is the practice on the farm to weigh daily the milk-yield of each cow, and have this recorded in a milk register. For the purpose of the experiment the milk-yields of the cows fed on the silver-beet have been taken for three periods: First period, one week before second period; second period, one week before being put on beet; third period, one week in the middle of the twelve days on beet.

"The results are as follow:—

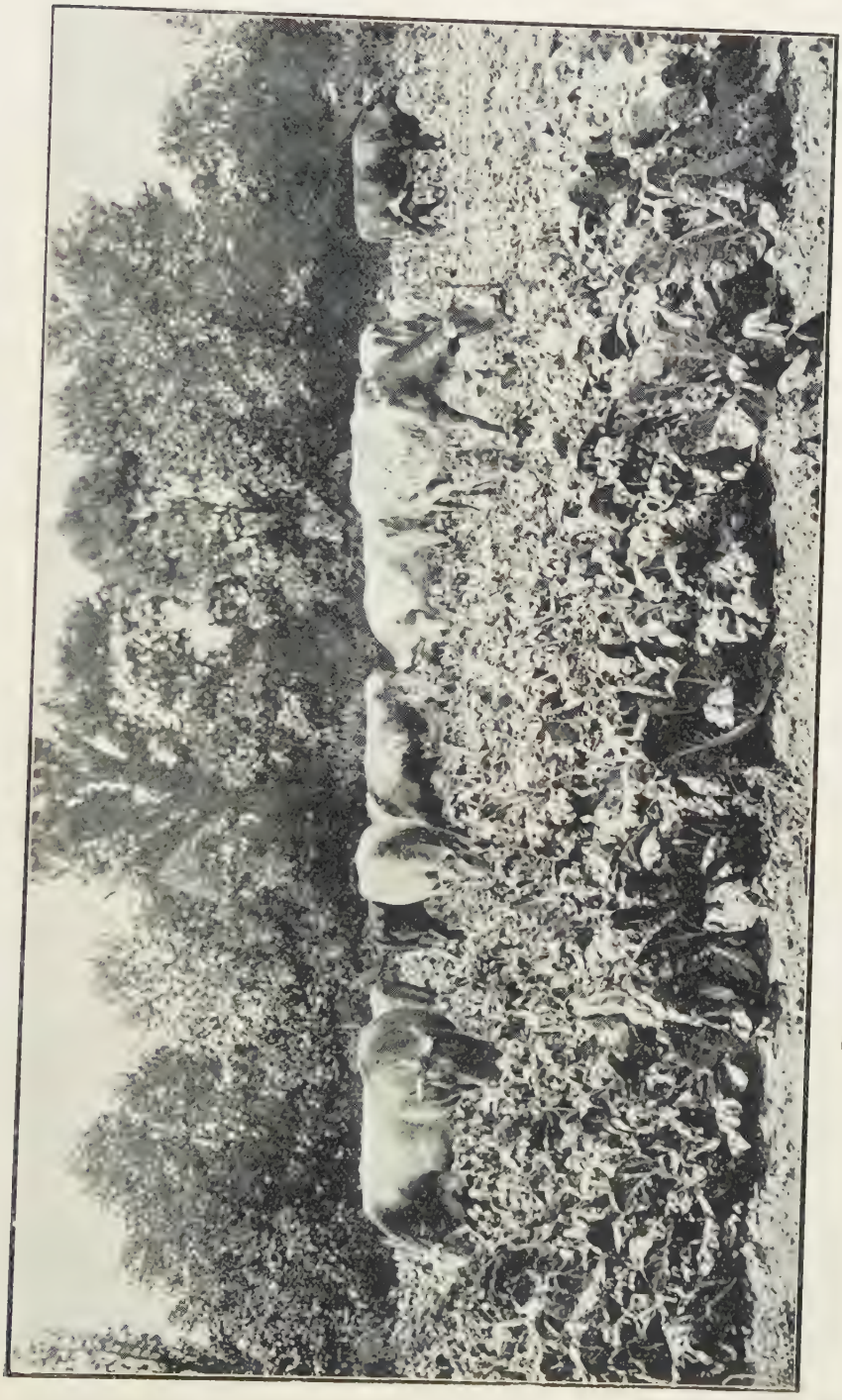
Cow.	First Period—5th to 11th February, 1914. Milk in Pounds.	Second Period—12th to 18th February, 1914. Milk in Pounds.	Third Period—22nd to 28th February, 1914. Milk in Pounds.	Cow.	First Period—5th to 11th February, 1914. Milk in Pounds.	Second Period—12th to 18th February, 1914. Milk in Pounds.	Third Period—22nd to 28th February, 1914. Milk in Pounds.
1	145	142	149	11	195	183	175
2	140	146	129	12	195	181	175
3	129	118	110	13	318	296	283
4	206	180	181	14	235	204	213
5	206	195	196	15	256	251	249
6	311	296	294	16	282	256	260
7	197	195	192	17	242	240	230
8	217	209	198	18	153	143	139
9	187	174	154	19*	..	234	272
10	149	143	139	20†	..	..	..

* Calved during first period. † Calved during second period.

"As a control, twelve cows' records taken at random from the rest of the herd which was left on the clover and Italian rye-grass are herewith given:—

Cow.	First Period. Milk in Pounds.	Second Period. Milk in Pounds.	Third Period. Milk in Pounds.	Cow.	First Period. Milk in Pounds.	Second Period. Milk in Pounds.	Third Period. Milk in Pounds.
1	136	130	123	7	232	236	213
2	193	185	169	8	199	200	178
3	182	164	163	9	267	250	240
4	208	198	186	10	238	218	215
5	199	190	172	11	254	245	232
6	187	172	163	12	226	231	225

"In regard to the cows put on silver-beet, the total loss of milk between the first and second periods (which is merely a difference in length of lactation) for eighteen cows was 211 lb.,



The Milking Shorthorns at Sunnyside on Silver Beet.

whereas between the second and third periods—that is, before and on the silver-beet—the loss is only 86 lb.

"In regard to the twelve control cows, these showed a loss of 102 lb. between the first and the second periods, and 140 lb. between second and third periods.

"Striking averages, we find that the eighteen cows lost 11·7 lb. each in the second period, but only 4·7 lb. each during the silver-beet period; whereas the control cows lost 8·5 lb. each in the second period and 11·6 lb. during the third period.

"These figures show that silver-beet is a splendid fodder plant for dairy cows, as thereby cows do not drop in their milk to the same extent as on good pasture which is drying up in the late summer months.

"The experiment also goes to show, from the splendid promise of another crop after close feeding by heavy cows, that silver-beet is a highly profitable fodder crop for the dairy-farmer."

ANOTHER CANTERBURY EXPERIENCE.

On a small farm of 80 acres at the Styx, Mr. John Curtis, the capable foreman of a large Christchurch seed-cleaning establishment, is feeding his cows on silver-beet, and is decidedly satisfied with the result. At the beginning of February he began to cut the beet for the cows, but as the pastures were fairly good at the time the stock refused to eat the new food. The grass on a

The Cattle eating

gravelly soil section of the property then began to fail, and with no succulence in their ordinary fare the cattle soon took to the beet. When they became used to it they ate it greedily. The result was gratifying. The milk-return was maintained, and at the present time it shows practically no decline, though had the beet not been available the cows must have failed in their yield altogether.

Mr. Curtis is somewhat of an experimentalist. He has not been in the seed business for the best part of a lifetime to fail to realize the value of good seed and the possibilities in plant-selection. For one-half of his field he used seed of the approved dark-leafed, white-stemmed variety, obtained from the Totara Estate, in North Otago, and on the other half imported seed. To see the field now is to realize the vast difference in the many varieties of this plant which are too often produced from the one packet of seed. The Totara seed has given a remarkably fine crop of the best type of silver-beet — the upright-growing compacted plant with a minimum of dark-leaved foliage and a maximum of pure-white midrib, a midrib which is long, wide, and thick, quite distinct from the short, broad midrib of the dwarf and more spreading type of dark-green-leafed variety. It is the midrib which provides the food-value of silver-beet, and not the leaf itself, as is sometimes supposed. Indeed, the cows usually eat little of the leaf proper when they have become accustomed to the beet. The imported seed has produced many types, but the

THE BEET AS THEY GO.

The Dark-leaved Section of Mr. Curtis's Silver-beet Crop

light-green leaf with clear-white midrib predominates. It is found that a midrib having a greenish tinge is not relished by stock, owing probably to its rather bitter taste. There is, Mr. Curtis considers, a great difference between the feeding-value of the dark and the light varieties, the former, in his opinion, affording

Plain Dark-green Leaf, with Broad, Clear-white, and Thick Midrib.

20 per cent. more feed than the latter. The dark-green plants—that is, the cut foliage—weighed from 12 lb. to 13 lb., while in exceptional cases the weight exceeded 14 lb.; the acreage yield of this variety being 48·89 tons, and that of the light-green 40·62 tons. This result was obtained on land which had never been manured

during the present owner's ten years of occupancy, and had been alternately cropped with peas and potatoes. Mr. Curtis is, however, a firm believer in thorough cultivation, and the land was well prepared for the silver-beet. The planting was thicker than is usually desirable, there being only 7 in. between the rows. The

Curled Dark-green Leaf, with Broad, Clear-white, and Thick Midrib.

result of this is a very dense growth, a condition rather unsuitable for grazing. The beet is cut with a scythe, a block of about 10 ft. square being cut each day, and is taken out to the cows on a small sledge. About half a ton is fed to the eight cows every day, and this is all the food they receive, the field in which

they run being quite bare. The beet is also given to pigs with good results, but in their case peas are used as a supplementary food.

The silver-beet was planted in the first week in November, and the first cut was made during the last week in February.

Plain Pale-green Leaf, with Broad, Clear-white, and Thick Midrib.

Judging by the present rate of recovery, the plants should be fit for cutting again in six weeks from the previous cutting, and this in the entire absence of rain.

Mr. Curtis intends reserving for seed selected plants of the dark-green-leafed variety.

GROUND LIMESTONE:

ITS VALUE ON NEW ZEALAND SOILS.

B. C. Aston, F.I.C.

Ground limestone, often sold under the name of "carbonate of lime," is any more or less finely powdered limestone which is approximately pure. Such a stone should not contain less than 80 per cent. of carbonate of lime, the remaining impurity being mostly sand and clay, or, to speak in chemical terms, iron oxides, alumina and silica. In most districts it should be possible to obtain a stone which contains between 90 and 100 per cent. of carbonate of lime, and, if such is the case, the cost of cartage and bagging, labour in handling and spreading, power in grinding, &c., will generally be much less than if a stone containing 10 or 20 per cent. more of impurity were employed. Each case must, however, be dealt with on its merits; and it is quite conceivable that local conditions on a given farm may favour the use of a rock containing a high percentage of clay, rather than going further afield for a purer product. Ground limestone, although it may have been kiln-dried or heated by other means to expel moisture, and thus enable it to be finely ground without balling or clogging in the grinding machinery, has not been heated to the temperature necessary to expel all the carbonic-acid gas, and thus differs chemically from quicklime (calcium oxide) or slaked lime (calcium hydrate). In order to make quicklime large lumps of limestone are heated in a kiln to redness for some hours, and both moisture and carbonic acid are expelled. On gradually adding water, or allowing it to absorb the moisture of the air, the lime becomes hydrated, or "slaked," and falls to the finest powder—far finer than any machinery could economically produce. Hence a given weight of quicklime is more powerful than the same weight of carbonate of lime, not only because it contains twice the amount of calcium or because of the changed nature of the substance, but also because it is in such a finely powdered condition that the powder may be spread with greater facility over a larger area of soil than is possible with an equal amount of ground limestone. It will be seen that "burnt" lime is, however, a much more expensive article to produce than ground limestone, for, in addition to the

extra handling in what is called "burning" or calcining the stone, the farmer objects to spread slaked lime owing to the difficulty in distributing it on windy days and the unpleasant caustic action of the powder on the hands, eyes, &c. Hence it has become common practice to grind the lime after burning, which introduces us to another lime-product—namely, ground burnt lime, on no account to be confused with ground limestone. This ground quicklime may be sown with a drill, and there is no loss in sowing the fairly coarse powder, as the atmosphere soon slakes it to a fine flour.

All the good effects resulting from the employment of quick or slaked lime on the soil may with greater safety be produced by ground limestone, being also alkaline in reaction and coagulating clays — that is, tending to destroy the sticky nature of soils, it renders them more porous and easier to work. It supplies a base so necessary in the operation called "nitrification"—the formation of nitrates from ammonium salts. If lime is not present in the soil there is a tendency for ammonia to be lost. Limestone promotes an alkaline reaction in the soil, which is more favourable than a neutral or acid reaction for the growth of the beneficial bacteria which transform the inert nitrogenous matter of soils into available nitrogenous compounds. Carbonate of lime liberates potash from the insoluable soil silicates and prevents potash fertilizers from passing into an unavailable condition. A good supply of lime in the soil prevents it from being invaded by such organisms as the destructive "finger and toe" of cruciferous plants. But probably the most important function of carbonate of lime on New Zealand soils (especially those deficient in phosphates), which are usually well supplied with nitrogen and potash and are not too difficult to work, lies in the favourable influence which a good supply of carbonate of lime exerts both on the phosphates naturally present in the soil and on those which are artificially added; for in the first place, it decomposes the phosphates of iron and alumina, which are with difficulty available as plant-food, with the formation of calcium phosphates, which are easily available; and, further, if acid phosphates such as superphosphate are applied, lime prevents the formation of the unavailable phosphates.

Hilgard, the great American authority on soils, has shown in a very luminous manner the relation which may exist between phosphoric acid-lime content of the soil and its fertility. He gives four instances of soils of high productive capacity which only contained 0·03 to 0·05 per cent. of "total" phosphoric acid; but the lime-content was high, varying from 0·6 per cent. to 1·4 per cent. (CaO). He then gives four examples of soils so low in productive capacity that they were wholly unprofitable unless

artificial fertilizers were applied. The phosphoric acid in these soils varied from 0·03 to 0·17 per cent.; but their lime-content was only from 0·07 to 0·11 per cent. I know of an instance in New Zealand where a similar state of things occurs — the phosphoric-acid content being very low, the lime-content exceptionally high, and the land extremely fertile. Where the soil contains a fair proportion of clay liberal dressings of ground limestone will undoubtedly exert a most beneficial influence on the availability of soil phosphates. I know of no better way of economizing the store of phosphates than by utilizing the great deposits of limestone which exist throughout this Dominion.

Mr. A. D. Hall, Great Britain's Development Commissioner, and formerly Director of Rothamsted, shows in one of his interesting works that the farmers of the eighteenth century must have put about 100 tons of chalk (a pure limestone) on the land. Arthur Young, the elder, writing in 1804, mentions the practice of applying sixty loads of chalk every ten years as customary in Herefordshire. This shows that the farmers of even that early period were fully alive to the necessity of liming or chalking. In America the importance of liming with cheap limestone is year by year becoming more generally recognized. The fact that ground limestone is obtainable in America for 2s. 9d. per ton may seem surprising, but I believe that a coarsely ground limestone could be obtained in New Zealand just as cheaply. It should be remembered that much of the limestone in the North Island is very easily reduced to a powder. Even in the process of quarrying much fine material is produced;* and it would be possible by merely screening the quarried stone to obtain a coarse dust good enough for liming the land. By choosing a suitable site for a limestone-works, by using modern machinery and labour-saving appliances, by avoiding handling as much as possible, and by loading in bulk into paper-lined trucks, it should be possible to supply a material at a price approximating to the American price, and then the farmer would reap the full advantage of the hundred miles free railage.

As will be seen by the above ancient customs in Britain and the growing practice in America, limestone is a substance which should be applied in large quantities—*i.e.*, by the ton rather than by the hundredweight. Two tons of limestone per acre is the smallest amount which should be tried on an experimental scale at first. Clay soils, or those containing a good proportion of clay, will

* The Mauriceville Lime Company will supply a limited amount of coarse limestone, containing lumps and powder, in bulk, at 12s. per 6-ton truck. Only about two trucks per day are produced, so that the supply is limited. A farmer would not be risking much in ordering a few trucks, and 3 tons per acre could be applied as an experiment. The heavier soils near Marton would be a suitable locality for a trial.

be found to respond to limestone treatment. Very tenacious clays may require a dressing of quicklime before they can be easily worked.

Little advice can be given on the localities which would be benefited by liming until a systematic soil survey shall have been carried out.

Conclusions.

Most New Zealand soils containing a fair proportion of clay are deficient in carbonate of lime, and the logical remedy is to apply to the land large quantities of lime, which should be obtained at a low price as ground limestone. Deposits are well distributed throughout the Dominion. Experiments should be tried with portable and with fixed machinery to ascertain that most suitable for New Zealand conditions. Demonstration plots should also be laid down showing the relative efficacy of—(1) ground limestone of varying grades of fineness, and, therefore, of varying cost; (2) varying quantities; (3) varying methods of application (hand-spreading, drilling with machine, &c.); (4) caustic lime in varying forms (ground quicklime, slaked lime); (5) all the above, with phosphates added; (6) various crops.

The experiments should extend over a few years, as the full benefits of the dressings may not become apparent in one year. A strict account of the cost of the labour and materials used in each experiment should be kept in order that the results may be compared.

MACHINERY FOR GRINDING LIMESTONE.

So many requests have been received for information regarding grinding machinery that illustrations are given of three machines which are on the market for that purpose.

The Patent "Lightning" Crusher and Pulverizer.

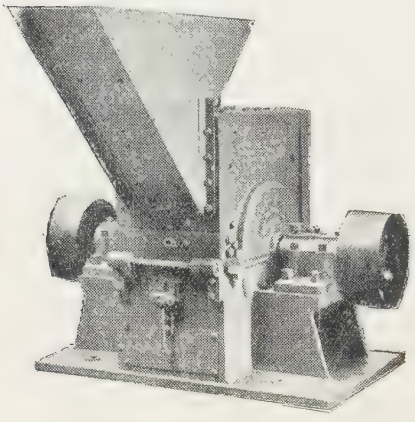
Following is an extract from a descriptive circular supplied by the New Zealand agents, Messrs. Richardson, McCabe, and Co. (Limited), Wellington:—

Construction and Action.—Its main features consist of a set of special-alloy-steel horizontal-swing hammers placed at equal distances from each other, and connected at their extremities by powerful screw-bolts with two parallel heavy discs, which act as fly-wheels, and turn with the shaft to which they are keyed at a speed varying from 300 to 1,600 revolutions per minute, according to the size of the crusher, the material to be treated, and the degree of fineness required.

On the shaft being set in motion, the hammers take up a radial position with relation to it, and, striking the material to be pulverized in suspension as it falls through the hopper, dash it with terrific force against the breaking-block in the opposite corner. The breaking-up of the material takes place between the hammers and the breaking-block, the friction of the parts while in suspension assisting the disintegration, and the final pulverization is effected by trituration between the hammers and the grinding-plates.

The material to be treated receives on an average 4,000 strokes per minute from an aggregate weight (speaking of the larger size) of 160,000 lb., or over 70

tons, without taking into consideration the impetus caused by the centrifugal force of the machine. On meeting with any unusually hard material, the hammers, being swing hammers, swing back a little, and then immediately swing forward to strike again.



Lightning Crusher and Pulverizer.

As each hammer occupies the whole width of the pulverizing-chamber, and its extremities turn truly on the screw-bolts by means of which they are linked to the discs, no space is lost, no friction occurs between adjacent hammers, as in some other disintegrators, and if the machine is properly used no clogging or wedging should be possible.

The casing is of cast iron up to 2¼ in. in thickness, and when desired it is made of steel. It is composed of two parts, the upper and the lower.

By an ingenious contrivance, called the "ejector," any piece of steel or other impulverizable substance that may by accident or inadvertence enter the crushing-chamber can be thrown out without stopping the machine.

Both the upper casing and the lower casing down to the screen are protected all over with lining-plates, varying in thickness from 1 in. to 2 in., according to the amount of friction that they have to endure and the amount of resistance required. These lining-plates are made of steel and of special alloy steel, the latter being fitted wherever friction is greatest. They are all easily interchangeable, and are fitted by means of bolts and nuts.

An indiarubber buffer to deaden shocks is fitted between the lining-plates and the casing.

Output and Motive Power.—These two items go together, and cannot well be treated separately. It is evident that the output depends upon the nature of the material to be pulverized and the degree of fineness required; and as the former varies widely, even in lots from the same source, it is impossible to guarantee a uniform rate of output, or to fix the precise amount of horse-power required, even for materials classified under the same category.

A No. 1 crusher (the smaller size), driven by a 12 B.H.P., will reduce pieces of limestone as large as a man's fist to fine powder at the rate of 2 to 2½ tons per hour.

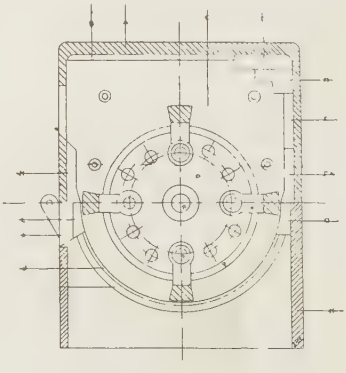
A No. 2 crusher, driven by 18 to 20 B.H.P., will reduce freestone in large pieces to fine building-sand superior to sea-sand at the rate of 10 tons per hour, and with greater horse-power, up to 12 or even 15 tons per hour, if deemed necessary.

It will disintegrate gravel at the rate of over 20 tons per hour, giving three-fifths of the output in ¼ in. pieces, and the balance to pass a ⅛ in. mesh.

It will take hard mineral ore of the size of a man's fist and reduce it fine enough to go through a 30 x 30 mesh, in one operation, at the rate of over 100 tons per twenty-four hours, taking only 50 to 60 B.H.P.

Wear-and-tear. — From what has been stated it will be seen that every precaution has been taken to give both the machine and its renewable parts the longest possible life.

When very hard and tough substances are to be continuously reduced from the size of a man's fist to fine powder, whatever the machine used, there must be a certain amount of wear-and-tear. Substances vary so much, even when obtained from the same source, that it is impossible to fix a uniform rate of wear-and-tear. All that can be done is to use the best possible material, and to pay the greatest attention to the construction of the machine and all its parts. In our case all this has been done, and is done. The lining-

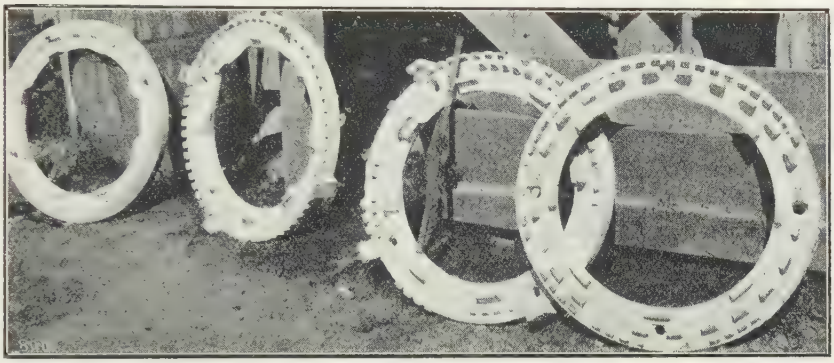


A Sectional View, showing the Internal Working-parts.

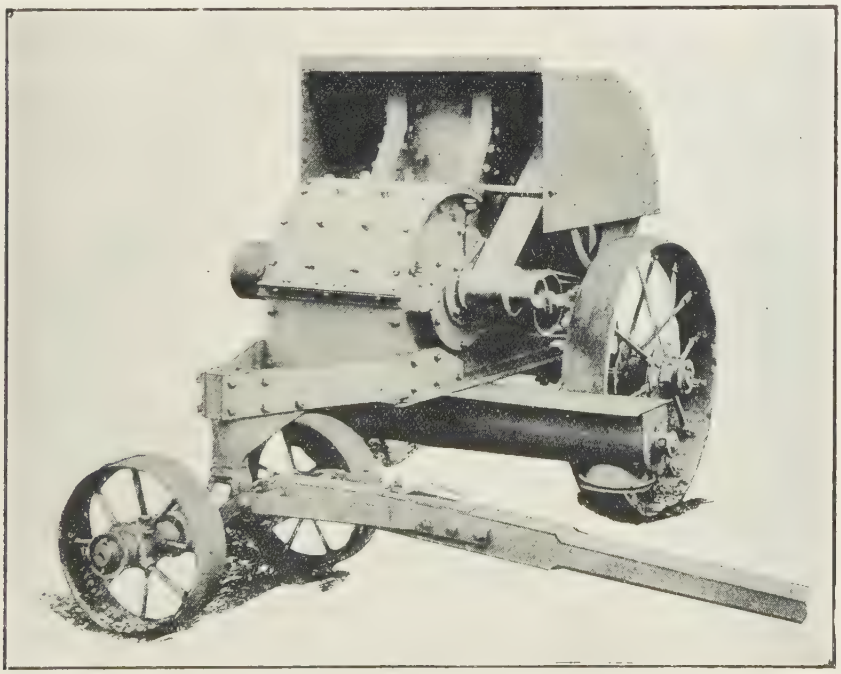
plates protect the casing, and the material of the lining-plates, hammers, and screen is so superior, being the best obtainable, that we are sure the wear-and-tear in our machines is as small as can ever be reasonably expected under the most trying circumstances. All wearing-parts are easily interchangeable.

Weights.—No. 1: Net, $1\frac{1}{2}$ tons; gross (for export), $1\frac{3}{4}$ tons. No. 2: Net, $3\frac{3}{4}$ tons; gross (for export), $4\frac{1}{2}$ tons.

Maximum Dimensions. — No. 1: Length, 4 ft. 6 in.; width, 4 ft. 10 in.; height (open), 6 ft. 7 in. No. 2: Length, 7 ft.; width, 6 ft. 6 in.; height (open), 10 ft.



Hardy Patent Pick Company's (Sheffield) "Devil Disintegrator."
Under favourable circumstances this will crush up to 5 tons of limestone per hour with an 8 h.p. engine. In use at the Mauriceville Lime-works.
(The illustration shows the working-parts. For scale see two-foot rule on wheel.)



Portable Crusher and Pulverizer,
For which Messrs. John Chambers and Sons, Wellington, are the New Zealand agents.

Dalmusternock White Blair.

C. E. Cuming, photos.] Fenwick Maggie.

AYRSHIRE TYPES.

The cows pictured on the preceding page were selected as heifers by Mr. James Dunlop in Scotland for the New Zealand Government, and are now members of the Ayrshire herd of the Moumahaki Experimental Farm. Dalmusternock White Blair gave 6,669 lb. of milk and 265·69 lb. of butter-fat for the 182 days ending 31st January, 1914. Fenwick Maggie gave 3,677·3 lb. of milk and 117·34 lb. of butter-fat for the 92 days ending 31st January, 1914.

RESIDUAL VALUE OF MANURES.

THE RUAKURA EXPERIMENT.

Primrose McConnell.

In the 1912–13 season there was initiated at the Ruakura Farm of Instruction an experiment to determine the results of applying the same manure to the same land year after year. The scheme was laid out on the No. 5 field. The results of the first season's work were fully reported in the September issue of the *Journal* of last year. The crop being then dealt with (swedes), the first crop of the experiment, was carted off and consumed by stock on another field. The crop now being reported on (Green's Ruakura oat) was unmanured, depending on any residue that may have been left behind by the swede crop.

Immediately the swede crop was removed the land was ploughed with the digger to a depth of 6 in., afterwards receiving three strokes of the tine harrows. The oats were sown on the 29th July, at the rate of 2½ bushels per acre. The manures applied to the previous crop (swedes) are given in the table on the following page—which gives the full details of the experiment to date—so as to enable readers who have not seen the previous report to understand the present report on the oat crop. A plan of the field accompanies the table.

Plot.	Fertilizers applied per Acre in 1912–13.	Cost per Acre.	Containing (per Acre)				Yield of Swedes per Acre, 1912–13, Roots and Tops.	Yield of Oats per Acre in Standard-weight Bushels (1913–14).	Straw per Acre (Hundredweights).	Total Gross Financial Gain as Result of Manuring in 1912–13, valuing Swedes at 5s. per Ton; Straw, 1s. per Cwt.; Oats, 3s. per Bushel per Acre.
			Nitrogen.	Phosphoric Acid.	Potash.	Sulphur				
		£ s. d.	lb.	lb.	lb.	lb.	Tons.	Bushels.		£ s. d.
1	No manure	.. ..	..	..	..	..	2·8	77·00	20	..
2	Basic slag, 424 lb.; kainit, 106 lb.	1 0 3	..	76·32	13·25	..	34·1	83·00	25	7 19 3
2A	Basic slag, 884 lb.; kainit, 216 lb.	2 2 0	..	159·12	27·00	..	38·7	91·00	30	9 9 6
3	Superphosphate, 448 lb.; kainit, 112 lb.	1 1 6	..	82·88	14·00	..	33·3	87·00	28	8 9 0
3A	Superphosphate, 896 lb.; kainit, 224 lb.	2 3 0	..	165·76	28·00	..	32·3	86·25	30	7 2 3
4	Basic superphosphate, 212 lb.; Seychelles Island guano, 212 lb.; kainit, 106 lb.	1 1 9	..	96·46	13·25	..	41·2	85·25	25	10 0 0
4A	Basic superphosphate, 448 lb.; Seychelles Island guano, 448 lb.; kainit, 224 lb.	2 4 9	..	203·84	28·00	..	41·3	85·50	28	9 1 0
5	Malden Island guano, 554 lb.; kainit, 112 lb.	1 11 6	..	149·58	14·00	..	41·0	81·00	27	8 18 6
5A	Malden Island guano, 560 lb.	1 8 0	..	151·20	..	..	46·5	70·00	25	8 4 6
6	Basic superphosphate, 448 lb.; sulphur, 112 lb.	1 8 0	..	82·88	..	110·88	43·1	80·50	25	9 9 0
6A	Basic superphosphate, 420 lb.; sulphur, 98 lb.	1 6 0	..	77·70	..	97·00	41·7	70·00	25	7 12 6
7	Basic superphosphate, 392 lb.; kainit, 98 lb.	0 19 9	..	72·52	12·25	..	37·2	83·50	25	8 16 9
7A	Basic superphosphate, 416 lb.; kainit, 104 lb.	1 1 6	..	76·96	13·00	..	38·7	73·50	27	7 13 6
8	Basic super., 392 lb.; kainit, 84 lb.; nitrate soda, 84 lb.	1 10 9	12·81	72·52	10·50	..	32·9	82·50	29	7 5 3
8A	Basic super., 404 lb.; kainit, 98 lb.; nitrate soda, 98 lb.	1 13 3	14·94	74·74	12·25	..	31·4	66·00	27	4 3 9
9	Blood and bone, 448 lb.	1 9 0	17·93	72·36	..	..	28·7	83·50	28	6 8 0
9A	Blood and bone, 484 lb.	1 11 3	19·36	78·13	..	..	28·6	78·50	27	5 19 3
10	Bonedust, 212 lb.; superphosphate, 212 lb.	1 3 6	8·48	92·22	..	..	45·6	80·50	28	10 9 0
10A	Bonedust, 224 lb.; superphosphate, 224 lb.	1 4 9	8·96	97·44	..	..	45·5	71·50	29	9 1 3
11	Bonedust, 212 lb.; superphosphate, 212 lb.; kainit, 106 lb.	1 5 9	8·48	92·22	13·25	..	32·1	81·50	30	7 4 3
11A	Bonedust, 224 lb.; superphosphate, 224 lb.; kainit, 112 lb.	1 8 0	8·96	97·44	14·00	..	33·7	80·50	30	7 7 0
12	Superphosphate, 404 lb.; sulphur, 100 lb.	1 4 6	..	74·74	..	99·00	35·1	78·50	26	6 4 6
12A	Superphosphate, 448 lb.; sulphur, 112 lb.	1 7 6	..	82·88	..	110·88	36·7	85·00	26	8 12 6
13	Seychelles Island guano, 404 lb.; sulphur, 100 lb.	1 6 0	..	108·18	..	99·00	42·6	85·50	28	10 6 6
13A	Seychelles Island guano, 448 lb.; sulphur, 112 lb.	1 9 0	..	120·96	..	110·88	44·2	80·50	28	9 16 6
14	Basic slag, 424 lb.; sulphur, 106 lb.	1 7 9	..	76·32	..	104·94	41·2	71·50	26	7 13 9
15	Basic slag, 312 lb.; basic superphosphate, 202 lb.	0 19 3	..	93·53	..	..	35·6	70·00	26	6 9 9

NOTE.—No fertilizers were applied in the 1913–14 season.

Sketch of Swede-experiment Plots, Ruakura Farm of Instruction.

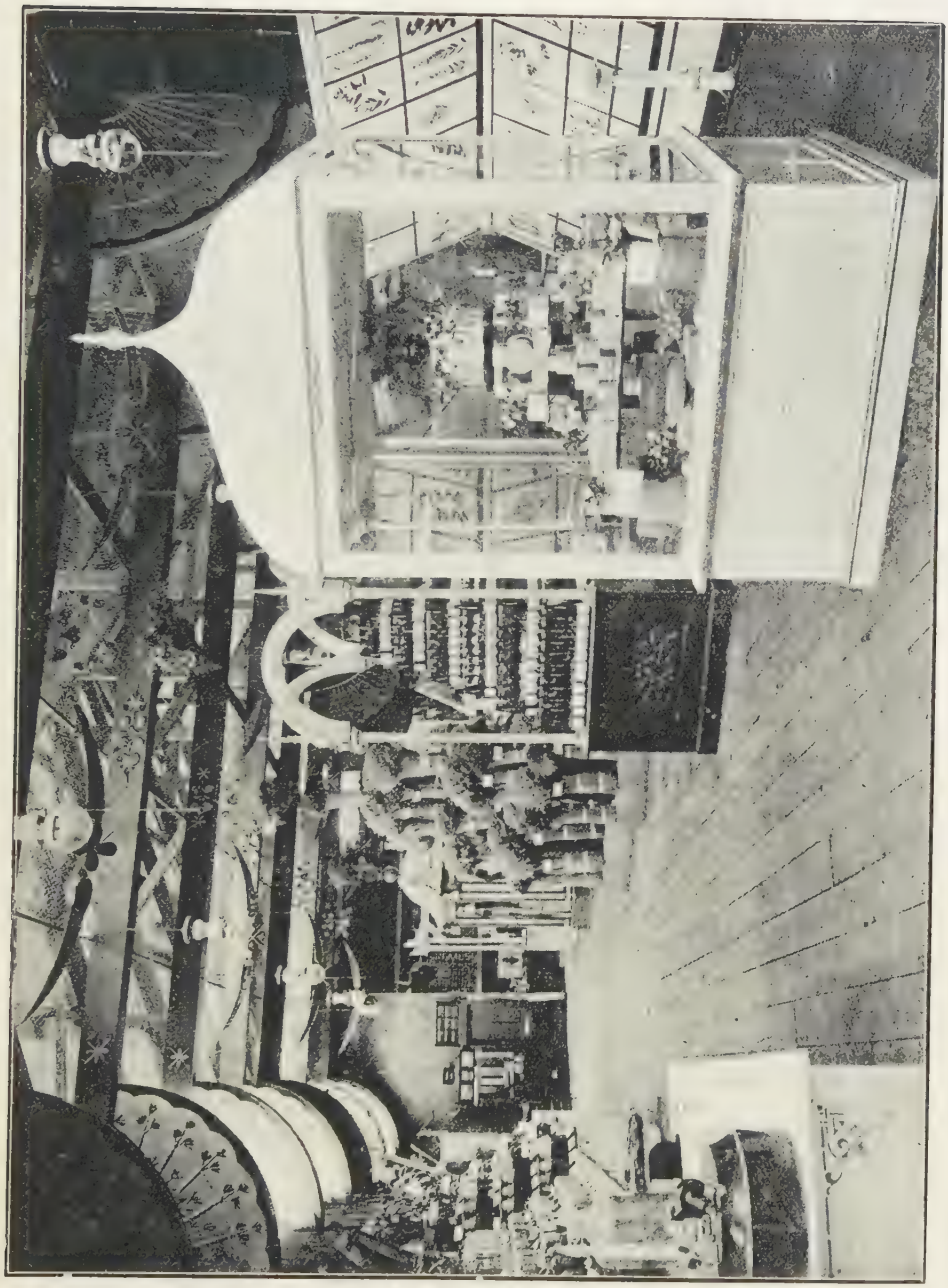
Summarizing on the above results, the most striking feature is the comparatively heavy field from No. 1 plot, which received no manure for two years. Although the yield of swedes was only 2·8 tons per acre (roots and tops) the yield of oats was 77 bushels. It is difficult to suggest a satisfactory reason for this result, except that, the swede crop being a failure, the soil could not be exhausted in any way. The plot received the same summer cultivation as the others. It was in every sense a bare fallow. The highest yield is from plot 2A, which received a double dressing of slag and kainit in 1912–13. On the other hand, no beneficial results were had from the double dressings on plots Nos. 3A and 4A. The question naturally arises, Where are the residues in the latter instances? Have the manures reverted to an unavailable condition, or are the comparatively lower forms due to too heavy a dressing of acid manures? The latter suggestion is not confirmed by the results from the cross-dressing of lime (see plan of field), as in no instance has liming in this paddock shown material effect.

The complete manure plots 8 and 8A have again given less yield than 7 and 7A, which received phosphoric acid and potash only. The lower yields from plots 7A and 8A than from 7 and 8 are undoubtedly due to the variance in soil—the plots are duplicated for this reason—but otherwise the yields are consistent. To understand the position of the plots the accompanying plan should be referred to.

As will be seen from the table, the greatest financial gain is from bones and superphosphate, and the lowest from the plots fertilized with a highly nitrogenous manure. The grain from each plot was threshed separately, and the greatest care taken in weighing and recording results. The weight of threshed straw is approximate. The average yield over the whole field is 80 bushels per acre, a result which speaks volumes for Green's Ruakura oat when the nature of the soil and the fact that no manure was applied are taken into consideration. The gross financial return for two years from the "no manure" plot is £13 5s., and this amount plus the cost of manures is deducted when recording the gross gain for manuring.

The field is now growing a catch-crop of turnips, each plot being manured with the same manures as previously, but in half quantities.

All manurial experiments prove that the best results are obtained only when the cultivation of the land is thorough; indeed, the maxim of Jethro Tull, "cultivation is half manuring," is likely to hold good for all time.



S. B. Taylor, photo.] THE DEPARTMENT'S COURT AT THE AUCKLAND EXHIBITION.

POISONOUS POTATOES.

B. C. Aston, F.I.C.

Since the article in the September, 1913, issue of the *Journal* was written this matter has been further investigated, with the following interesting results:—

Poisonous potatoes from three different sources were planted in November and December. The tubers were in excellent condition for strong and rapid development, being green and the shoots well formed from the eyes. No artificial fertilizers were applied, and, on appearing above ground, the plants were earthed up well and the tubers kept below the surface. The plants' growth was rapid, and, although no spray was applied to them throughout the experiment, they maintained a healthy condition, being entirely free from blight. The new tubers were dug at the end of March, and were of excellent eating-quality, without any trace of nauseous taste, green appearance, or bacterial infection. Some of the potatoes were on the small size owing to the experiments having been terminated before growth had finished, and also, no doubt, because artificial fertilizers had not been applied. The whole of the tubers were consumed with avidity owing to their excellent flavour, supplying the household with the vegetable for a fortnight. No unpleasant taste or poisonous symptoms were experienced by those eating them, even when comparatively large quantities were consumed. The general appearance of the potatoes was that of good new potatoes. The parent samples from which they were grown were obtained from widely different sources — viz., Wanganui, Palmerston, and Wellington—and had in every case given rise to poisonous symptoms in those eating them.

Thanks to the courtesy of Messrs. Hodder and Tolley, of Feilding, I had an opportunity of visiting one of the districts where a large number of poisonous potatoes had been grown, one firm having had as many as 10 tons discarded for food purposes. One pleasing feature is that the worse the potatoes are for eating the better they are for planting. The poisonous properties are developed, I am convinced, as the result of exposure to daylight, whereby a condition—a green colour and eyes sprouted—is reached which is favourable to strong and immediate growth on planting. Hence the owner of the 10 tons had no difficulty in disposing of his wares.

I examined the field, situated at a high elevation, on which the potatoes were in one case grown, and found the soil extremely light, and, being subject to continuous winds, therefore easily blown away. In this instance the potatoes were left in the field a long time, both after digging and after bagging. Further, the potato in question, Northern Star, which was in nearly every case the variety at fault, produces its tubers in great quantity near the surface, and in the light soil would tend to push it upwards, and therefore to expose the tubers to light.

Mr. Deem, Fields Supervisor for the district, since my note in the *Journal*, has supplied me with samples of tubers and an interesting account of the cases which came under his notice. From his and other reports I gathered that the symptoms experienced after eating the potatoes are severe headache, pains in the stomach, and vomiting, with a feeling of tightness or contraction in the throat. A bitter taste is experienced on masticating and swallowing the potatoes, which is one of Nature's warnings that the substance should not be swallowed—a symptom which should on no account be disregarded. Some sufferers have assured me that the word bitter does not correctly define the sensation. A nauseous, burning constricted feeling in the throat describes it more nearly. One correspondent who, with pathetic perseverance, endeavoured to consume his store of roots, complained that every time the members of his family partook of certain potatoes they felt ill. There is, as I have shown, no need for any one to suffer in order to save waste. Discarded potatoes may be more advantageously disposed of than by eating them. Mr. Deem confirms the statement that the potatoes were left a long time in the field before and after bagging, being left on the ground a week or more before being bagged.

In a report to the British Local Government Board on "Bacterial Food-poisoning," Dr. W. G. Savage (see *British Food Journal*, September, 1913) notices that "a considerable number of outbreaks of food-poisoning have been reported from the consumption of potatoes. It is rather noticeable that many of these outbreaks have occurred amongst troops. At one time they were attributed to solanin-poisoning, but later investigations have shown that the amount of solanin is quite insufficient to produce the symptoms. Later investigations have shown that the poisoning properties are due to bacterial activity. At the present day there are no sufficient grounds for separately classifying potato-poisoning outbreaks as different from those due to the consumption of meat and other kinds of food. The symptoms, for example, are those of ordinary food-poisoning, and not distinctive, as in mussel-poisoning. Their

comparative frequence is no doubt due to the fact that peeled potatoes are valuable nutrient media for bacteria."

I am strongly of opinion that in the present instance bacteria have little to do with the trouble. I submitted the matter to Mr. H. A. Reid, F.R.C.V.S., &c., who kindly replied as follows, under date the 10th January, 1914: "In reference to your inquiries respecting bacterial action in potato-poisoning, I can find nothing in the literature at my disposal in support of this statement; all references agree that the poisonous properties are due to solanin. It may easily be supposed, however, that once a potato has become the seat of bacterial growth—and it is peculiarly suited for that purpose—it might, in the same way as meat or other material, be able to poison as the result of the presence of toxins or products of bacterial metabolism, which in many cases are not destroyed by ordinary cooking processes. I have wondered whether or not certain of these cases of potato-poisoning in the human subject may be due to acute intestinal obstruction. It is now largely held that death in cases of this condition follows as the result of acute toxæmia through absorption from the bowel-contents, which, of course, has been the seat of active bacterial development. Potatoes would tend to increase intestinal stasis, and some people are given to eating inordinate quantities of this vegetable to make up, very often, for a deficiency in more nitrogenous food."

It is desirable that medical men who have cases of potato-poisoning under their notice should take a careful note of the symptoms, particularly noticing whether the pupil of the eye is affected, and whether any mydriatic alkaloid might justly be held to blame.

The symptoms and other data of the European-known cases of potato-poisoning are quoted in full from Taylor's "Medical Jurisprudence" in this *Journal* (Vol. vii, No. 3, p. 301, September, 1913). Wynter Blyth's "Poisons" summarizes the symptoms in about twenty cases of poisoning by the fruits of various species of *Solanum*, to which genus the potato belongs, in common with the deadly nightshade, belladonna, and other well-known poisonous plants. He states that the most opposite phenomena have been witnessed as the effects of poisoning by the same substance. The most constant phenomena are a quick pulse, laboured respiration, great restlessness, and hyperesthesia of the skin. Albumen in the urine is common. Nervous symptoms, such as convulsions, aphasia, delirium, and even catalepsy, have been witnessed. In some cases there have been the symptoms of an irritant poison—diarrhœa, vomiting, and pain in the bowels: in many cases dilatation of the pupil was observed. Rabbits are killed by doses of 0·1 gr. (of

solanin) per kilo. The symptoms commence in about ten minutes after the administration, and consist of apathy and a low temperature; the breathing is much slowed. Convulsions set in suddenly before death, and the pupils become dilated. The post-mortem appearances in animals are intense redness and injection of the meninges of the cerebellum, of the medulla oblongata, and the spinal cord. Dark-red blood is found in the heart, and the kidneys are hyperæmic. The intestinal mucous membrane is normal.

Conclusions.

The evidence in the cases of potato-poisoning which have been noticed during the year, and which are still fairly common, points to faulty treatment of the potatoes in the field, and careless preparation of the vegetable in the kitchen, as responsible for the inedible state of the cooked tubers.

Cultural experiments have shown that the potatoes which were inedible as a vegetable were excellent as seed, and produced—when the common precautions, which should be general knowledge, were observed—very good edible tubers.

Precautions.

1. Potatoes intended for food should be adequately earthed up to prevent the sunlight greening them.

2. On digging they should be bagged with as little delay as possible, and removed to a shed.

3. Any green potatoes should be reserved for seed purposes, and on no account be eaten.

4. A nauseous taste in the cooked potato should at once cause it to be discarded as unfit for food.

Science in Agriculture.—It might truly be said that only within the last two decades has the importance of the scientific investigation of the infinite number of problems arising from agricultural practice received, in some measure, general recognition. During this period it has become more and more evident to those engaged in the production of plant and animal commodities that it is sometimes merely foolish, and at others almost dangerous, from an economic point of view not to accept the help freely proffered by agricultural educational authorities. The aid given by these bodies may be embodied in one or several schemes, such as the institution of demonstration experiments to illustrate certain manurial and cultural measures, the value of which is indisputable, facilities for consultation with experts in cases of special fungoid and insect pests, educational measures by means of in-college lectures and peripatetic work, and, lastly, the creation of a close connection between the farmer and the research worker.—*Nature.*

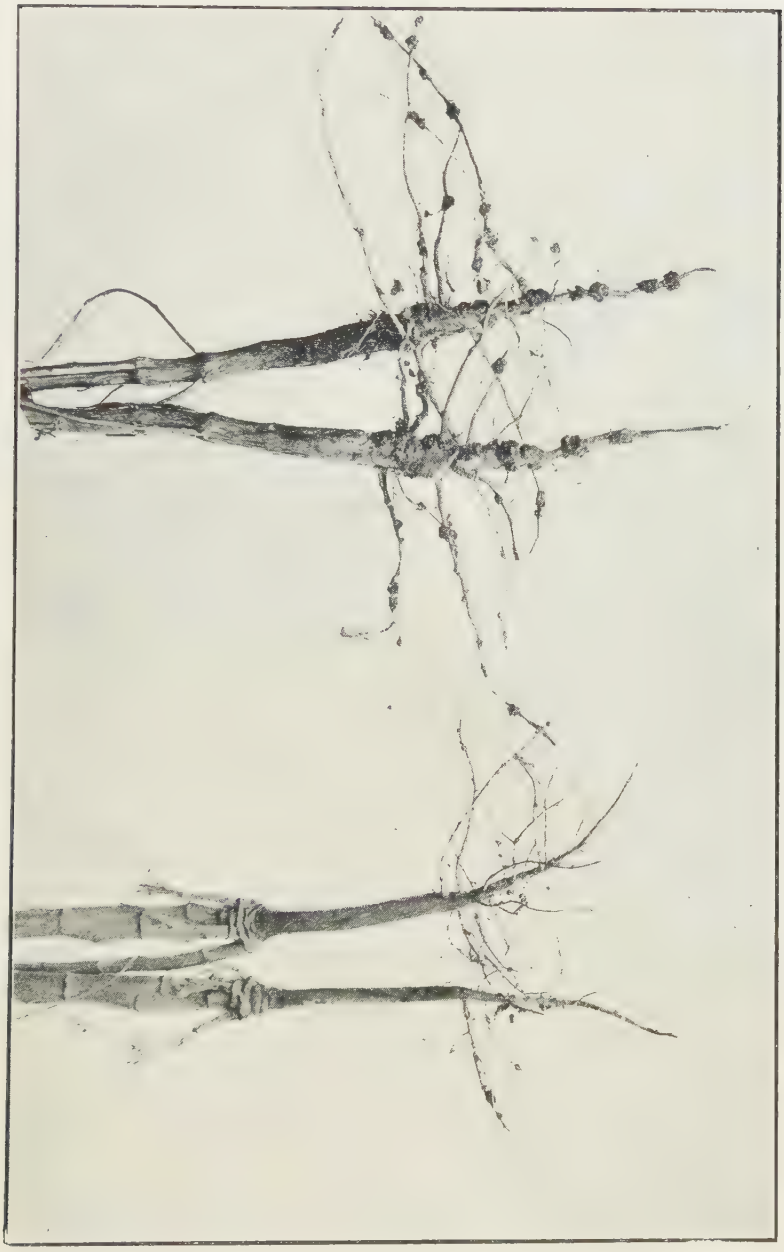
LEGUME NODULES.

Primrose McConnell.

Many attempts have been made to explain the cause and functions of the nodules that in the majority of cases appear on the roots of leguminous plants, such as beans, peas, tares, lupins, lucerne, clovers, &c. For centuries it has been accepted by successful agriculturists that the growing of a leguminous crop had always a most beneficial effect on the soil. No attempt was made at explanation until nearly the end of the nineteenth century, when the thesis was advanced, and generally accepted, that the enrichment of the soil that followed the growth of a legume was caused through the agency of certain bacteria in those legume nodules which had the power to fix atmospheric nitrogen. Lately quite an opposite opinion has been advanced, but it need not be discussed here, the writer's object being to describe some experiments carried out this season at the Ruakura Farm of Instruction, and to leave the readers to form their own opinion.

In connection with the action of beneficial soil bacteria, it is generally accepted that they are powerless to act in an undrained, unlimed, badly cultivated, acid soil. In order to put this to the test, about 4 acres of a semi-sterile and undrained acid swamp, in which sorrel had almost taken full possession, was sown with lupins (blue, white, and yellow). The land was roughly ploughed and indifferently harrowed, so as to curtail aeration of the soil as far as possible. The white and yellow varieties made little growth, but the blue variety flourished amazingly, and carried an exceptional weight of well-filled pods. An examination of the roots also revealed on every plant masses of nodules. Now, if those nodules contain nitrogen-fixing bacteria, the idea that they can flourish only under good conditions as to soil and cultivation must be abandoned. If the nodules are merely a fungoid disease, which some authorities affirm, and which seems to be further affirmed by the experiment under discussion, then the nodule-bacteria theory must be reconsidered.

In another paddock, which is well drained, and which has been under successful cultivation for some years—and perhaps the best field on the farm—a small area was sown with the same varieties of lupin. In this experiment each variety was sown



Roots of Lupin-plants grown in Well-drained, Well-cultivated Soil.

Roots of Lupin-plants grown in Undrained, Sour Swamp Land.

in a separate plot, the white proving to be the most suitable. Although the cultivation and other conditions in this instance were everything that could be desired and, in theory, ideal for the beneficial action of soil bacteria, yet on the roots of many of the plants no nodules were in evidence, and in no instance were they pronounced. It was also observed that the plants whose roots

Soya-bean Plant grown in Inoculated Soil.

Soya-bean Plant grown in Untreated Soil.

[*S. B. Taylor, photos.*]

carried no nodules were quite as vigorous as those on which the nodules were present.

Similar results were obtained from an experiment carried out with soya beans in the nursery. In this instance part of the plot was inoculated with soil from an old soya-bean plot, the other plot being untreated. All other conditions as to soil and

manurial treatment were similar. In each case the plants made vigorous growth and flowered and podded equally well (if there was any difference it was in favour of the non-inoculated plot); but an examination revealed well-developed nodules on the roots of the plants from the inoculated plot, while on those of the non-inoculated plot the nodules were absent. Here again it would seem to prove that the presence of nodules do not give more vigour to the plant than when they are entirely absent; also it seems to support further the fungoid-disease theory. It has also been demonstrated on various occasions that a legume plant devoid of nodules will increase the nitrogen-content of the soil to as great an extent as when the nodules are present.

It is well known, however, that the application of soil from an established lucerne plot to one which is about to be sown with lucerne (in 50 per cent. of cases) ensures success when otherwise there would be failure; but this does not prove that the inoculation is effected by means of the nodules that may be transferred with the soil.

The plants illustrated by the accompanying photos were not specially selected, but are an average of the several plots under experiment. The fact that the blue lupin flourished under such adverse conditions suggests great possibilities with this plant as a soil-improver. In Europe it has already been the means of converting some of the poorest land from a state of sterility to one of the highest fertility. In Germany it has been found that a ploughed-under crop of lupins increased the fertility of the soil to a greater extent than a heavy dressing of farmyard manure. The lupin is of little value as a forage crop.

The fundamental idea behind the parcel-post systems of the world is that the producer may reach the consumer direct.

I have sent the *Journal* Home and have had them passed on as far as the Island of Tobago, Trinidad. Everywhere the publication has been read it has been very much appreciated.—*F. W. Simms, Wellington.*

In the list of qualified veterinary surgeons which appeared in the February issue of the *Journal* the name of Mr. E. Lloyd Siddal, M.R.C.V.S., should have been marked with an asterisk to indicate that Mr. Siddal is an officer of the Live-stock and Meat Division of the Department.

CO-OPERATIVE EXPERIMENTS.

SUMMARY OF SOUTH ISLAND WORK FOR LAST SEASON.

A. Macpherson.

Following is a list of co-operative field and other experiments conducted in the South Island for the season 1913–14, being a summary of the 3,819 experimental plots, together with the number of farms concerned in each class of experiment. It will be noticed that one farm may have more than one class of experiment.

Experiment.	Farms.	Total Plots.
Carrots	9	141
Turnip manurial test	25	200
,, variety test	36	869
Swede manurial test	4	32
,, variety test	34	747
Silver-beet	23	23
,, variety	13	28
,, manurial	10	57
,, No. 6 scheme	1	1
,, Otago scheme	5	5
Lucerne square test	129	516
,, variety	3	20
Japanese millet	1	1
Wheat manurial test	2	10
,, variety test	8	109
Oat manurial test	5	25
,, variety test	26	272
Barley manurial test	1	5
,, variety test	5	23
Maize variety test	5	56
Mangel manurial test	8	56
,, variety test	11	364
Chou moellier	11	12
Potato manurial test	8	43
,, spraying test	7	37
,, variety test	4	60
Grasses, &c.	9	73
Buda kale	3	3
Kohl-rabi	1	2
Rape	3	6
Thousand-headed kale	4	4
Parsnips	1	2
Pea variety test	2	14
Lupin variety test	1	3
		3,819

PINUS RADIATA PLANTATIONS.

EFFECT ON SOIL-FERTILITY.

A. H. Cockayne.

There is a widespread belief that *Pinus radiata* is a great soil-exhauster, and that ground once occupied by this tree becomes very infertile. This supposition appears to be due largely to the fact that in dense plantations of this tree there is practically no undergrowth. Again, the pine-roots extend over a considerable area, and plants growing in close contact to the root system of the pine are generally stunted and do not thrive. In practice, however, it is found that when the pine-trees are cut down and removed the soil is admirably suited for the growing of all kinds of crops. The ground, of course, has to be stumped to permit the use of the plough. During a recent visit to the Otekaike Special School for Boys I was greatly impressed with the fertility of soil that for thirty-five years had carried a *Pinus radiata* plantation. Some four years ago the trees were cut down and the stumps removed. One portion of the ground was converted into a garden attached to the principal's residence, and the other portion has since been used continuously for growing the vegetables for the institution. No manure of any kind has been used on the land.

The accompanying photographs demonstrate how well grass and other plants flourish on the site of pine plantations. It is evident that the growing of *Pinus radiata* instead of weakening the soil-fertility has the very opposite effect, through, no doubt, the gradual decomposition of the fallen "needles" increasing the humus-content and therefore the fertility of the soil. Apart from the utilization of pine-plantation land for general farm purposes, it seems quite feasible to expect that "clear" cutting of *Pinus radiata* can be followed by another crop of the same tree. In this case no stumping would be necessary, the planting of the young trees taking place immediately after the ground had been logged. Under this policy it is reasonable to believe that a succession of crops of *Pinus radiata* could be taken off the same area.

The Lawn in the Foreground of the Picture was the Site of an Old Pinus radiata Plantation.

A. H. Cockayne, photos.]

A Corner of the Garden made at Otekaike on the Site of a Former Pine Plantation.

AGRICULTURE ABROAD.

INFLUENCE OF AGE ON QUALITY OF PROGENY.

One frequently hears it said that very young and very old animals are less likely to produce offspring as robust and of as good quality as those in the full vigour of life. The subject has not been very closely studied, and we are as yet unable to say to what extent the fitness and keenness of the animals when mated may influence the vitality and development of the resulting progeny. It is reasonable, however, to believe that they have such an influence, and therefore it is a point that all stock-breeders should take into their calculations. To some extent the inferiority of the progeny of many young animals may be due to the fact that in primiparæ the milk-glands are often insufficiently active, and the progeny is in consequence deprived of a good measure of that share of "breeding" which is said to "go in at the mouth." Matrons also are rightly regarded as better mothers than young dams, and their offspring gain a better start in life. In the case of old age in either male or female improvement is less likely to result by breeding, and the offspring will in all reasonable probability be born in a poorly nourished condition, and, if reared, will be small and weedy. It is a common practice on many farms to retain favourite old mares after they have been pensioned off and let them breed, but in many cases I am convinced it would be kinder and less costly to let them end their days in peace.

We have next to consider whether differences in age within the limits of the period of profitable breeding will affect the quality of the progeny. The term "quality" may refer either to symmetry of form and character of hair, skin, bone, and tendon, or to ability to perform well on the track. In both cases, however, the age of the parents within such limits would appear to have little or no influence. The old English blood mare Pocahontas bred Auracaria (a noted brood mare) at twenty-five years. Hambletonian X sired his fastest son when eight years old, his next fastest at sixteen, and the next at twenty-one. Electioneer's three most noted gets were sired at seventeen, thirteen, and twenty-one years respectively; whilst Volunteer produced his best at twelve, nine, and seven years. Examples might be multiplied indefinitely, but sufficient have been quoted to confirm the statement that, if judgment be shown in the mating, stock of high quality are as likely to be produced towards the close of the profitable breeding period as at the commencement or during the middle phase.

It has already been pointed out that both young and old stock are uncertain breeders, and it is therefore possible to understand why the best results are not obtained when the influence of age is overlooked. In practice it is found that in order to secure

a high percentage of increase, and to favour the production of the best-quality stock, young females should be mated with vigorous well-seasoned males, whilst those that are approaching the finish of their breeding careers are better put to sires that still retain the freshness and vitality of youth. The combination of young females with robust males is more likely to bring about successful "nicking" than the use of old females with young sires; and, after all, it is every breeder's ambition to so blend the strains as to enable him to make some appreciable contribution to the improvement of the breed. When dealing with stock that are in their prime the choice of suitable mates will depend on physical and temperamental characters and on the known breeding-capacity, but preference will generally be given to sound hardy types that have passed through the early stages of their stud-work.—*W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S., addressing the South Australian Agricultural Bureau Congress on "Some Problems in Stock-breeding."*

SULPHUR AS A FERTILIZER.

The most recent contribution to the discussion on the use of sulphur as a soil-fertilizer is provided by Herr W. Janicaud, Director of the Horticultural Experiment Station of Mülhausen, who publishes the results of his experiments in *Die Gartenwelt* (17th January). Mr. Janicaud used the tomato as his test plant, and carried out his culture in pots. The tomatoes (Lucullus) were grown in various conditions—some in soil to which no manure was added; others in soil to which was added flowers of sulphur (2 grams per 1 kilogram of soil = $\frac{1}{3}$ oz. to 2 lb.); and others which received either a complete manure only, or a complete manure together with sulphur. The conclusion reached is that sulphur, even in the presence of a complete manure, acts as a stimulator to the growth of the plant. Dr. Hiltner, who estimated the numbers of bacteria present in the manured and unmanured soils, finds that the effect of sulphur is to bring about a remarkable increase in the bacterial population. Thus the number of bacteria was found to be—

Soil.	Bacteria per Gram of Soil.
Unmanured	.. 12·51 millions.
Sulphured	.. 23·59 ,,
Completely manured and sulphured	.. 16·16 ,,
Completely manured and unsulphured	.. 10·97 ,,

—*Gardeners' Chronicle.*

CO-OPERATIVE CREDIT IN INDIA.

During the official year, 1912–13, the number of agricultural co-operative credit societies in India increased from 7,562 to 11,382, of which 11,296 are co-operative credit societies and sixty-three were societies for the co-operative insurance of live-stock. The number of members increased during the year from 325,000 to 467,000, and the working capital from £1,215,000 to £1,935,000. During the year the

members deposited with the societies £120,000, and repaid loans to the amount of £800,000. Deposits were withdrawn to the amount of £64,000, and the new loans made to members amounted to £1,440,000. The amount of interest received by societies was £148,000, while the interest paid on loans and deposits was £91,000, thus leaving a margin of profit in interest of £57,000, or about 4 per cent. per annum on the average amount out on loan; and as the charges for establishment and contingencies amounted to altogether only £13,000, or a little over £1 per society, there was a substantial profit on the working of the year.

The most common rates of interest which the societies find it necessary to pay in order to secure the capital required for their working vary from 6 to 9 per cent.; and the most common rates charged by the societies on loans made to their members vary from about 9½ to 12½ per cent. These rates may sound high as compared with the rates current in Western countries, but are only about half the rates usually charged by the village money-lender, even to a solvent small holder; and the rapidity with which the movement is spreading over the whole of India shows that the illiterate peasants have found that it meets their urgent needs by providing them both with a safe place of deposit for their savings and with a means of borrowing small sums for their agricultural operations at a much lower rate of interest than they would otherwise have to pay.—*Journal of the British Board of Agriculture.*

THE HONOLULU FARMER.

WHAT THE AMERICAN GOVERNMENT DOES FOR HIM.

E. Clifton.

The United States Government has instituted at Honolulu a Territorial Marketing Division, under the direction of the Bureau of Agriculture.

This is What it does.

1. Advise the producers what the Honolulu market requires, and when to sell.

2. Receive any article of island produce from any island resident, and sell it at the best obtainable price.

3. Gather statistics of wholesale price of island produce—cattle, sheep, hogs, poultry, eggs, vegetables, fruit, grain, &c.—and publish it for the information of the public.

4. Answer questions concerning the state of the market, and furnish information not covered by the market quotations.

5. Furnish seeds, crates, and bags at cost.

Conditions of Sale.

(1.) All sales are for cash.

(2.) Returns to the customer are made in cash as soon as the transaction is completed.

(3.) No charge is made for the service; it is absolutely free.

Before sending any produce to the market the farmer must notify the Division —address, P.O. Box 753. Wireless address, "U.S.E.X."

6. Any one can buy at the market, but sales of wholesale quantities and packages will not be broken.

These are Some of the Results.

The Territorial Marketing Division of the Department of Agriculture commenced operations in December of last year.

Until July it did not have a store-room. It is now devoting its energy to assuring that supply to enable it to accept remunerative contracts.

The market is handling from one hundred packages upwards daily. As an instance of appreciation: a shipment of pigs was put on the open market; the best offer was 11s. 6d. The lot was handed over to the Marketing Division, with the result that, after paying all charges, £4 over the offer on the open market was secured.

Another Instance.

Turkeys could not be sold during the holidays at 1s. 3d. per pound. The Division took them and marketed them, with the result that the realization was 1s. 8d.

Pigs and Poultry form Big Items of Trade.

The Division has large pens, where the stock is held if the supply is over the immediate demand. Feed and transport are the only added cost.

7. Market quotations are published weekly; these are furnished to farmers and dealers. If a farmer has produce listed on these quotations, or proposes to market it or to raise such produce, and is somewhat uncertain about the state of things, the Division will look into it for him.

8. A directory of stock-breeders is maintained, together with lists of dealers' requirements.

9. Remittances and accounts are made bi-weekly, and advances are made on unsold consignments.

With sufficient and regular consignments the success of the Marketing Division will be assured.

U.S.A. DEPARTMENT OF AGRICULTURE.

The San Francisco *Chronicle* of 14th January, 1914, notifies that great changes are contemplated in the Agricultural Department of the United States of America. It is proposed to reduce the present thirteen bureaux or subdivisions to not more than four or five. Each of these will be under a special chief. The principal subdivisions are: Quarantine and Disease Prevention; Scientific Research Work; Demonstration Work for Farmers—this is to be largely extended; Administration. The Agricultural Bill will include an appropriation which, it is said, will exceed £4,000,000.—*E. Clifton.*

A COMPLIMENT TO NEW ZEALAND.

In the San Francisco *Chronicle* of 14th January, 1914, it is mentioned that the live-stock breeders of the United States of America propose to meet in convention at San Francisco during the currency of the Panama Exposition, 1915.

Among the eminent agriculturists and stock-breeders who were present at the meeting where this convention was decided upon was Mr. P. J. Shields, of Sacramento Valley, who prophesied a bright outlook for the farmer, and for the dairy-farmer especially. He declared that the dairy-farmer need not fear the outcome of the importation of New Zealand butter, as it would result in the endeavour of the farmer to produce an article of as good a quality as the New Zealand butter. He would make prize butter all the year, instead of, as now, producing such butter for exhibition competitions only.

Mr. S. H. Green, president of the Creamery-managers' Association, spoke on the improvement of butter necessary if there was to be successful competition with the imported article.

Farmers in the Sacramento Valley are not receiving from 5 to 8 cents per pound of the price of 1912. Butter on 13th January, 1914, was quoted at 27 cents per pound. For the same quality in January, 1913, it was 33 cents, while in the same month of 1912 it was selling at 36 cents.

According to some of the largest butter-merchants of the Sacramento Valley, while the tariff alteration was partly responsible for this decline, it was almost entirely due to the importation of butter from New Zealand.—*E. Clifton.*

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

Primrose McConnell.

Although May brings with it indications of winter, it brings with it no respite for the intensive farmer or his soil. If the highest results are desired, the "sower must tread on the heels of the reaper." In the North Island oat-sowing should be commenced. Early sowing, as a rule, gives the best results; also it provides a valuable green fodder for sheep stock during the winter. It is advisable not to let the crops be too far advanced before turning on the stock, and it is a good plan to turn on as large a mob as is available, so that the time occupied in feeding off may be as limited as possible. As to the quantity of seed per acre, a great deal depends upon the variety of oat. If the oats are sound and of medium size, 2 bushels are ample, as the early sowing and the subsequent feeding-down cause the plants to stool out better than when sown late. Good preparatory cultivation is as necessary for the oat crop as for any other, but it need not be deep; if the seed is placed at too great a depth the yield is never so good; indeed, this may be said to apply to all seeds. On good well-cultivated soil this crop requires no manure; and, where necessary to apply it, basic superphosphate is perhaps the best. If the soil is very light, the addition of a small quantity of potash will increase the yield as a rule. Catch-crops of tares and barley or tares and rye may also be sown in May. Western Wolths grass gives excellent results if sown during this month. It must be remembered, however, that though an excellent fodder it is a great soil-exhauster, and does not stand drought. On the other hand, the peas or tares are soil-improvers, and should always find a place in the rotation. A number of inquiries have come to hand *re* the value of this grass in a permanent mixture. If sown at all with permanent

grass-seeds the quantity should be very small—not more than 2 lb. or 3 lb.—as a larger quantity would result in the smothering of the finer and slower-growing varieties.

All who intend laying down a few acres of lucerne should get the land ploughed and limed at once. When the nature of the subsoil will admit of it the ploughing should be at a good depth, and where the subsoil is hard and poor the subsoil-plough may be used to great advantage. The incalculable value of this plant is now placed beyond any dispute, and with land at such a price as now obtains no intensive farmer can afford to do without it. It is a plant that has come to stay, and can bring nothing but prosperity in its train. The time has come when all stock require extra care, particularly dairy cows and stud stock. He is a wise farmer who has secured a store of winter fodder in the shape of hay, roots, ensilage, or catch-crops, and he can defy the worst of weathers. Catch-crops sown after harvest (North Island) will now be fit for feeding off, and for dairy cows or any other stock they will be found to be of great value. A supply of mangels will also help to bring the pig herd through winter at a comparatively low cost. Stud hoggets, particularly on low-lying country, should already be receiving a liberal ration of dry feed, and there is nothing better than sweet chaff and a few sweet peas plus a small allowance of roots. Nothing helps the young stock to resist the attacks of internal parasites better than dry food, salt, and a change of pasture as frequently as possible. At one time the loss of stud hoggets at this station was very heavy, but by the above treatment the death-rate has been reduced almost to vanishing-point. Where foot-rot is prevalent the sheep stock will require increasing attention in the matter of foot-paring and passing the flock through the foot-bath at short intervals. Possibly a solution of arsenic is the best remedy. When a sheep is badly attacked with foot-rot the owner may say good-bye to profit—it is one of the most ruinous diseases if neglected, and in many districts it can be successfully coped with only by unceasing care. Cows in full milk should now be rugged. There is, of course, variance of opinion on this subject; but a cow will give a maximum yield of milk only when she is kept in the greatest comfort that circumstances will permit. Rugs should be unlined, and have a tail-strap in preference to the two that pass between the insides of the thigh and udder. Dry cows are better unrugged until they calve.

Open drains that have not been cleaned out should be seen to at once, and attention paid to the roofs of buildings; doors, gates, and fences requiring repair should be seen to. Ruts on farm roads should also be filled up.

Foals and young horses should not be turned out to find their winter's living on a bare pasture only; a little chaff and oats in addition will yield a very handsome profit. On the other hand, they should not be coddled, but just receive sufficient supplementary feed to keep them in the healthiest possible condition. A few roots make an excellent addition to the chaff.

On wet days the time may be filled in with odd jobs, such as painting implements, repairing and oiling harness, &c. Some of the spare time will also be well spent in reading and study, for the farmer who has nothing to learn does not exist.

THE ORCHARD.

W. A. Boucher.

The advice has frequently been given to those intending to plant fruit-trees that it is desirable that the land intended for such a purpose should be well worked before the trees are set out. The best method of preparation is by ploughing in the spring, summer-fallowing, sowing a cover-crop in the late summer or early autumn, and ploughing this crop in before planting. General rules, however, cannot always be adhered to, and instances sometimes occur which make it out of the question to carry out the advice suggested above. In such cases the next best proceeding for the preparation of the land for spring planting will be to plough deeply as soon as possible, allow the land to lie in the rough during the winter months, cross-plough again in the spring and subsoil at the same time, afterwards by harrowing thoroughly work down the soil to a fine tilth before laying it off for planting.

Heeling-in Nursery Trees.

Many nurserymen commence to fill orders received early in the season, so that trees often reach intending planters at a time when, owing to climatic and soil conditions, it would not be desirable to plant them out. In such cases, in order to protect the roots, it becomes necessary to dig a trench in well-prepared land and lay the trees in either singly or in small bundles, covering with loose earth, care being taken to shake it in among the roots, and press down firmly with the foot. This will protect the root system from undue exposure to the weather until such time as a favourable opportunity may occur for planting.

Pruning.

In some of the colder fruitgrowing districts of the Dominion early frosts will have caused the trees to shed their leaves and arrive at their dormant period. In such cases pruning may be commenced. In the warmer districts pruning should be deferred, as it is unwise to cut back while a considerable amount of healthy foliage remains. It is to be remembered that almost up to the time that the leaves fall the foliage is exercising a beneficial effect on the health and vitality of the trees.

Spraying Peaches and Nectarines.

Throughout the Dominion wherever these fruits are grown the trees are subject to attack by various fungus diseases, the most serious of all in its effect being die-back (*Clasterosporium carpophilum*). Growers are reminded that although this fungus will almost inevitably cause serious injury to the trees in the spring, still, with the advent of cold weather, attacks of varying severity are likely to occur. Undoubtedly the best method of protecting peach and nectarine trees from injury by fungus diseases is to spray with the Bordeaux mixture, winter strength, as soon as the leaves have fallen, in order to carry the season's growth through the winter in a healthy condition, and to repeat the application in the spring when the buds are swelling.

The Lemon Orchard.

Of late years the lemon has proved a profitable crop, justifying every care and attention to the trees. Lemon-trees are subject to attack by both insect pests and fungus diseases. One of the latter, brown-rot (*Pithiacistis citrophora*), made its appearance and threatened to cause serious loss to lemon-growers. Within a short period infected specimens were received from localities distant one from another, and at one time it almost seemed that the lemon orchards generally would become affected. After the first outbreak, however, there seems to have been no further spread of infection, so that apparently the measures recommended by the Department and adopted by growers who had asked for advice with regard to this disease were successful. Still, it would be as well for those who have lemon-trees to keep the crop under observation as colder weather sets in, for it is with the advent of cold weather experienced at the approach of winter that the disease can be first noticed during the season. The first symptom of trouble is the appearance of a brown spot on the skin of the almost-matured fruit. Within a short period a livid ring will appear around the spot.

Fruits infected will commence to drop. This would suggest to growers that advice should be sought and, if necessary, prompt action taken. The measures recommended for prevention and control have been to apply in the autumn a soil-dressing of pulverized sulphate of iron at the rate of 1 lb. to 4 lb. per tree, according to age and size. This should be scattered beneath and around the trees, and lightly worked into the soil. As an additional precaution the trees should be sprayed with the Bordeaux mixture, 4-5-50 strength.

THE VINEYARD.

S. F. Anderson.

Vine-house Notes for May.

Mention has been made in previous notes and in the bulletin on the vine of the importance of allowing the vine to obtain the fullest advantage of its foliage. Much harm will be done by depriving the plant of its foliage in the early autumn. Plant physiologists have proved by analysing the ash of leaves taken from a plant when in full growth, and also from those that have fallen in a natural way in the autumn, that there is a considerable difference in their constituents. From the time the leaves have attained their full size and before they fall they yield up many important substances, such as starch and protoplasmic as well as mineral matters, including phosphoric acid and potash, to the permanent part of the plants. Cutting back the shoots that have borne fruit as soon as the crop is gathered is, therefore, interfering with the natural storing-up of these important substances. Some growers are in the habit of doing this with the mistaken idea of "plumping up the buds," others to let in the light to ripen up the wood and to lessen the general pruning. The proper way is to throw the house open after the crop has been gathered, in order to allow plenty of air to assist any further growth before the cold weather sets in and to allow the wood to ripen in a natural way.

The vine-house can now be fumigated with the hydrocyanic gas without any fear of doing harm to the vines. Where mealy bug is very bad it is advisable to give two fumigations, one following the other within a few days. The usual formula of $\frac{1}{3}$ oz. cyanide of potassium by weight (avoirdupois), $\frac{1}{3}$ oz. sulphuric acid by measure, and 1 oz. of water by measure for every 100

cubic feet of space. These quantities may now be doubled—viz., ⅔ oz. each of the first two and 2 oz. of water to every 100 cubic feet. At the second fumigation the gas will penetrate well into the crevices and destroy many of the eggs. The fumigation should be done before pruning. After pruning use the clay-and-tar paint on the rods.

Copies of directions for fumigating and preparing the clay and tar will be supplied to growers on application to the Division of Orchards, Gardens, and Apiaries, Department of Agriculture, Wellington.

The Shanking of Grapes.

Several bad cases of shanking have come under notice this season. In every case it could be traced to overcropping and depriving the vine of its foliage to a damaging extent. In every instance of the grapes failing to colour it was due to this same cause, and generally accompanied by more or less shanking. Imperfectly drained borders and neglecting the ventilation are also causes. Anything that debilitates or weakens the vine renders it liable to disease.

THE POULTRY-YARD.

F. C. Brown.

May is one of the principal winter-egg months, and is, therefore, a period of considerable importance in the poultry calendar. It is especially the time when the difference between sound and weak methods in egg-production is most marked. To the man who manages the business properly, who rigorously culls out the unprofitable birds, has only the very best of the two-year-old hens in hand, has no superfluous male birds, and has a strong flock of pullets laying "at top," the month of May should show a good return over cost of production. On the other hand, to the poultryman who has retained the majority of his second-year hens and has failed to rear the necessary number of pullets, or, if he has a good flock of these, has overcrowded his houses by reason of the large number of old birds, May will probably prove one of the most trying and disappointing months of the year, for much will be going out and little will be coming in. The weakness in the latter case is too often intensified by the owner reducing the ration of the birds because they are not laying. If the fowls are

expected to lay at all, whether at this or at a subsequent stage, it is sheer foolishness to stint their diet. It is nearly as bad as the practice of the man who keeps his high-type layers on short-commons in the summer (to check production) in order to force the eggs out of them in the winter. Many good second-season layers fed well for egg-production up to the present may have the appearance of being in excellent form, but may not respond to a good forcing diet for a month or two. To reduce their diet now would obviously be false economy. Perhaps the most important principle in the management of utility poultry is to feed them well from first to last, and it is impossible to overfeed the bird of the laying temperament. An exception to the latter statement may be noted: It is possible to overdo the feeding if highly nitrogenous material, such as meat or substitutes of this. This is specially demanded for the manufacture of the artificial egg-product of the modern fowl. It should therefore, not be fed except when required for this purpose; and when provided for the heavy layer should, if at all possible, be fed separately, so that each bird may obtain all it requires and no more. Some birds may not need any of this special egg-food, others may be content with a mere taste of it, while there are birds, the highest type of layer, which demand from 1 oz. to 3 oz. of meat a day, and even in exceptional cases more than this.

While meat in some form is a most valuable item in the dietary of the heavy-laying bird, it should be used with the greatest care, for meat may do as much harm when used at the wrong time as it will do good when employed at the right time. Many an instance of the harmful effect of meat I have recently noticed among young growing stock, which, instead of being steadily developed into good-sized and vigorous stock, have been forced to maturity before they have attained anything like the standard requirements, especially in regard to size, of their particular breed. I do not mean that size should be everything, but, without going to the extreme of certain fanciers, we should aim at securing birds which, while true to Lewis Wright's standards, possess the desired utility characters and have sound constitution. Judging by the plates published by Wright, there is nothing in the standards laid down by him which is antagonistic to the best utility type and the possession of the necessary stamina. While the fancier makes a mistake in breeding for exceptional development of some fancy point, the utility breeder makes an equally fatal error in aiming at early maturing but improperly developed (undersized) stock. In both cases the best interests of the breeds concerned are being injured. A happy medium must be the objective.

Valuable laying-strains of such breeds as Rocks, Wyandottes, and Orpingtons can be secured without destroying their breed characters and their size and stamina. I have seen, however, many White Rocks which, while most attractive birds, were no bigger than a desirable type of White Leghorn. The point need hardly be emphasized that if such a breed is to be refined down it merely becomes an egg-laying machine like the Leghorn, and is no longer a valuable general-purpose breed.

The hen, and even in greater degree the pullet, cannot be expected to lay to the best advantage if its only opportunity to exercise is on a stale and filthy run. Where the alternate run (a most important provision) is not available it is necessary, especially where the soil is of a retentive nature, that it be turned over at frequent intervals. Poultry-sick soil is obviously not conducive to the maintenance of the birds in the best health, which is imperative if they are to lay to the best advantage. It is sound economy to put a netting partition down the middle of a run, and keep the birds off one half in order to give the grass on the other portion a chance to come away. There is nothing more conducive to heavy laying than a fresh grass run. The clean run (and there is no better means of making a run clean than by the production of new grass) is just as necessary as the clean house.

Clean Eggs.

The best way of ensuring the winter egg is by the use of the deep open-fronted house, in which the birds can be fed inside and confined in comfort in unfavourable weather. In some districts the money saved by thus protecting the grain from sparrows would in one season more than compensate for the cost of making houses of sufficient depth to confine birds and feed them under cover. There is everything in favour of feeding in the house. Certainly the best results from grain-feeding are obtained when the birds are given their ration in litter and, having to scratch for it, are forced to take their share in a gradual manner. This keeping of the birds under shelter all the time during wet weather has another compensation — it enables the eggs to be secured in a clean condition. There is more in this than is generally supposed. The washed egg never presents the attractive appearance of the egg taken from the nest in an absolutely clean state. And is there nothing in the saving of labour in washing eggs—one of the most disagreeable things associated with the ordinary methods of egg-production? I have known many a promising youth lost to the business by reason of having to wash practically every egg produced. Clean nests are, of course, essential. If any difficulty

is experienced in securing a sufficient supply of good nesting material, clean gritty sand will be found excellent for the purpose, as if a little of this does adhere it can easily be brushed off without affecting the desired bloom of the egg.

Demand for Improved Stock.

Last season's demand for sittings of eggs, especially of general-purpose breeds, from the Ruakura Farm of Instruction and the Milton Poultry-station was by far the greatest since these were established. Many orders, even early in the season, had to be refused. Already the surplus pullets of the more popular breeds have been sold, and the demand for cockerels is so great that it is probable these will all be sold out well before the season closes. It may be pointed out that the selling season for stock birds has commenced one month earlier this season than hitherto. Intending purchasers would therefore be well advised to order early to save disappointment.

Do not overcrowd.

In these days of disease and the frequent lowering of the vitality and productive power of birds by parasitic life, overcrowding, a prolific cause of these troubles, should be rigorously guarded against. Though this is not a season of the year when culling is ordinarily desirable, the poultryman whose houses are badly overcrowded would be well advised to send the worst of the old hens to market. It is impossible for birds to lay well under unfavourable conditions, and it is better for five hundred layers to be doing their best than six hundred to be doing indifferently and then be contracting troubles which may end in disaster.

Breeding for Egg-production.

Scientific investigators in several countries are endeavouring to discover how to place the breeding of fowls for egg-production on an exact basis. One authority is discounting the value of the female in perpetuating the egg-yielding power. I prefer to believe that the fundamental rules which are guiding the breeders of other classes of live-stock apply with equal force to poultry. Just as the milk-record bull is the best sire for the dairy herd, so the best rooster for the breeding-pen is the son of a great layer; but it is difficult to believe that the cock descended from great layers will throw as good egg-producers through a poor-laying hen as through a heavy producer. To expect a good result from a male in which egg-producing power is a strong hereditary character mated with a bird which does not possess in any degree the same characteristic is tantamount to saying that as good a result will be gained by

crossing a laying breed with a non-laying breed. I am convinced that type must be the main consideration, and type in which indications of laying characters are happily blended with constitutional points in the case of both the male and the female. Of course, I fully appreciate the value of performance, which is the best guide we have to egg-laying power; but the mere ability to produce a certain number of eggs in the season is not everything. When practical experience of utility poultry is extended the recognition of an absolutely definite type will become an acknowledged truth. Theory will never settle the question.

A Commendable Departure.

The New Zealand Utility Poultry Club is to be congratulated on its decision to provide a separate class for heavy breeds in its next annual competition. With the high-type laying-stock available at the present time the main competition honours are absolutely confined to the White Leghorn, and breeders of the utility type of such breeds as Wyandottes, Rocks, and Orpingtons are discouraged from competing, even though they may possess strains of a great laying type. Obviously it could hardly be expected that breeds which are valuable as flesh-producers would be able to lay the same number of eggs as breeds bred solely for the one purpose. That the egg-laying power of the general-purpose breeds mentioned can be greatly improved is undoubted, and probably when the desired improvement has been effected their value, especially to the farmer, will be greater than that of the highly specialized breeds. To ask the best laying representatives of heavy breeds to compete on even terms with the picked birds of the great laying-strains of White Leghorns now being bred in this country has been only discouraging competition and, incidentally, the work of advancing their egg-yielding power. With a separate competition for the heavier breeds there will be the desired encouragement to the breeders of these to enter birds for competition, and a great fillip will be given the important work of improvement from the egg-producing viewpoint. That this will have an important bearing on the poultry industry is undoubted. The wider extension of general-purpose breeds, in which decent table-quality will be combined with heavy laying-capacity, will certainly make the business appeal more strongly to the farmer, the main factor in the egg- and poultry-supply business of the Dominion. And the more the farmer extends his poultry-keeping operations the greater will be the demand on the breeder of egg-laying types of stock. Another innovation I would like to see would be a state-

ment at the end of each competition giving the actual value of the eggs produced by each pen—that is, the value calculated according to the average market price of eggs ruling for each week during the year. With a knowledge of the cost of feeding it would then be possible to determine with a fair degree of accuracy the respective egg-producing values of the different breeds.

Age to breed Heavy and Light Birds.

An obvious clerical mistake occurred in last month's notes. It was stated in line 1 on page 324 that the heavy breeds should be hatched in October and the light breeds in September. The reverse is, of course, the case. The heavy breeds, which take longer in coming to maturity, should be hatched out at least a month earlier than the light breeds.

THINGS TO REMEMBER.

Successful poultry-keeping is principally a matter of management.

Half the breeding goes down the mouth. The stinted youngster never develops into the best type of adult.

Cleanliness is the best means of fighting disease, and is essential to the most profitable production.

To run stock continuously on a grass run season after season is inviting trouble.

Birds do better on a small piece of fresh ground than on a large area of tainted soil or herbage.

Keep only those fowls that will show a profit. Feed better and keep less.

THE APIARY.

F. A. Jacobsen.

All the important work of the season connected with the apiary will now have been finished, and there remains very little, if any, direct bee-work to be accomplished.

Leaky Cover.

It is advisable during the winter to renovate and paint hives intended for use next season, and so prolong their life as much as possible. Leaky covers may be improved by covering with cheese-cloth and then applying a thick coat of paint.

Fumigating.

Tiers of combs should be stacked so as to be mouse-proof, and in a dry place. Should any doubt exist as to the presence of the wax-moth the tiers should be fumigated. Place an ordinary saucerful of bisulphide of carbon (which is enough to fumigate 27 cubic feet of space) above the combs, and replace the cover. The fumes, being heavier than air, sink through the combs and destroy any insect-life. Great care should be taken, as the liquid is very inflammable and the fumes explosive.

Cleanliness.

All utensils that have been used during the season should be thoroughly cleaned and left in a sanitary condition until again required for use. Also the honey-house should receive an overhaul and be thoroughly cleansed.

Shelter.

Erecting suitable shelter, or planting trees or shrubs to answer that purpose, is of considerable importance. Exposure to cold winds often results in the chilling of brood, and cannot be but detrimental in other respects to successful bee-farming.

Clarifying Wax.

When melting wax add 1 oz. of sulphuric acid to every gallon of water. Rain-water is the most suitable for this purpose on account of its softness. Well-water often contains lime, which renders the wax a brown colour. Also, too much lime in the water will cause some lime to unite with the fatty acid of the wax, saponifying it, thus leaving, after the wax has cooled, a soft grey spongy substance on the under-side. Add the wax, broken into fairly small pieces, to the solution of sulphuric acid and water, and keep at a temperature of 158° F. for from one to two hours. Allow the wax to cool, then scrape the impurities from the bottom of the cake. The sulphuric acid clarifies the wax wonderfully, and precipitates the foreign matter.

Testing Wax for Impurities.

The following are some methods that may be used to test the purity of wax:—

Melt a quantity of wax in boiling water and stir thoroughly. If impure, the water becomes cloudy, and after allowing it to stand for a short time the solid substances are precipitated.

Another way is to dissolve the wax in ether, benzene, or spirits of turpentine. The solids will then be precipitated to the bottom of the vessel, and the amount of adulteration can be judged.

A third method is to place a small piece of suspected wax in a test-tube, add some spirits of turpentine, and gently heat over a spirit-lamp. If the solution is imperfect or cloudy, or if a precipitate is formed, the wax is adulterated, for spirits of turpentine dissolves wax completely.

To detect paraffin in wax, heat it in the fumes of sulphuric acid, which destroys the wax, converting it into a black jelly-like mass, while the paraffin is left in a transparent layer on the surface.

Granulation.

Honey granulates upon standing because of the ability of its dextrose to assume a crystalline form much more readily than the levulose.

Honey contains about equal proportions of dextrose, levulose, and water.

Pure yellow beeswax has a specific gravity of 0·960 to 0·963. Tropical waxes may reach 0·967.

Honey contains 80 to 85 per cent. fermentable sugars.

A New Company.

The Canterbury Beekeepers' Association has formed a company—the Canterbury Honey Producers' Co-operative Association (Limited)—for the collection, distribution, and export of honey. Active steps are to be taken to procure members throughout Canterbury. Mr. H. R. Best is the provisional secretary, and Messrs. A. Ireland, C. A. Jacobsen, R. N. Gidley, E. G. Ward, and J. Rentoul are provisional directors.

THE GARDEN.

W. H. Taylor.

The Vegetable-garden.

It is quite common on farms to draw the supply for domestic purposes from the fields. In many places no special provision is made for home use, and when there are no field crops the home is without vegetables. Others, while giving more consideration to the home supply, merely plant or sow in a corner of a field prepared for farm crops. This, while being certainly a little better,

is not likely to be the means of keeping up a supply. Where it is desired to keep up a supply of vegetables the only way to make it practicable is to lay out a plot as a permanent garden. For many reasons it is worth while to make a garden of this nature. One is that only by systematic arrangements can a supply of vegetables worth calling a supply be obtained. The supply from the fields is at best only spasmodic, and available only when most things are plentiful. And the things grown in this way are only of the commonest description. A properly prepared and properly cropped vegetable-garden is a source of pleasure as well as convenience and profit. Not that I mean by the latter remark that it may save money; doubtless it will not do that, for the cheapest way is certainly to go without. But when a thing is desired it is most profitable to endeavour to secure it by properly directed efforts and systematic methods. To grow uniformly good vegetables throughout the year is impossible unless ground is specially prepared and specially devoted to the purpose. In the field whatever is to be grown is put in at a time most likely to suit the crop, but the table has its requirements all the year and the garden is made for the purpose of supplying those requirements. Dry weather, or exceptionally wet weather, may have the effect of causing the failure of the field crop, but the garden should be in a condition to be superior to such effects. Thorough drainage not only prevents loss from heavy and long-continued rain, but actually makes it beneficial. When much rain falls on well-drained land the soil becomes thoroughly saturated, but the surplus finding its way into the drains, no stagnant water remains. To combat drought, deep cultivation is resorted to, which in the case of a vegetable-garden means that the soil is trenched two or more spits deep and manure of some description trenched in, so that the moist humus will entice the roots of plants to go down out of the dry top soil, and thus enable them to flourish during dry weather. These conditions can but seldom be secured on a large scale, and without them vegetable-growing is more or less a matter of chance. A good vegetable-garden is, moreover, subject to constant cropping with small lots of many different varieties and repetition of the same, which is possible only on a properly formed garden. The management of the space may not have much effect on the quality of the vegetables, but it certainly does on the economical working and the appearance. There is no reason why a vegetable-garden should not be to a large extent ornamental as well as useful. A well-arranged garden with flourishing crops is, in fact, a very pleasant place to walk in; and in the inverse, a badly managed garden is at once a source of annoyance and a waste of labour. Running

along by the side of a path there should be a strip or border kept entirely for small-stuff things that are wanted in small quantities or only occupy the ground for a short time, such as garlic, shallots, chives, radish, lettuce, summer turnips, red beet, and a bed of herbs. It is much handier to grow such as these on a border, arranging the planting or sowing in the necessary number of short rows, than in long lines like cabbages, &c. A small square patch is handy to dig over when the crop is past, and, besides being handy to work, these borders can be made to look very pleasing. The border need simply be a strip of the garden reserved for the purpose, not separately laid out; such things as require to be in lines should be at right angles to the path. It may be argued that by keeping to the same spot year after year there will not be much opportunity for rotating the crops That depends, however, on its extent, and it is not of much consequence in any case. I may point out that rotation of crops is of most importance in field culture, where only the top soil is worked. In the Old Country there are gardens that have been cropped for hundreds of years. Surrounded, as they are, by high brick walls, it is practically impossible to change the site, yet they produce as good crops as ever. I myself worked in a garden that had existed over four hundred years. The way the soil is kept in heart is by feeding with manure and frequent retrenching. Every year sees a portion done, so that the whole is trenched every three years. Every time the ground is trenched a new surface is thrown up, while the old surface is resting. It is because of these benefits that a properly prepared and cared-for garden produces such good stuff. Also, where this is done there is less heard about failures due to dry weather. Now is a good time to trench old ground or to break up new. When the soil is in a moist state it is easily worked, and breaks up better than when dry. Neither trenching nor draining should be done while the soil is hard and dry, because it adds very seriously to the cost.

When new land is being trenched care should be taken to keep the soil in its original position, top soil still on top, for the subsoil of new land is usually quite sterile. It is only after it has been trenched and a liberal quantity of manure and humus-making substances trenched in that the lower strata become rich. The way to proceed with trenching is as follows: Suppose the plot to be trenched is 50 ft. wide, mark it out in equal halves and trench half at a time. Mark out a strip 2 ft. 6 in. wide along the top of one half, throw out the top spit into a heap beyond the plot, then throw out the under-soil into another heap. A good depth to trench is 2 ft.; 2 ft. 6 in. is better, but it is foolish to trench

deeper than you have material for. It is useless to break up the soil unless you put something under it to keep it from binding again. It may be worth while here to digress a little. It may be contended that this statement is opposed to fact, and that farmers frequently subsoil, and know their crops benefit thereby. I must point out, however, that working by hand is very different from ploughing. The benefits derived from subsoiling by plough are only temporary. It costs something to trench an acre 2 ft. deep, and it is, therefore, useless to do it in a way that will give only temporary results. The first trench being cleared out, mark off another strip exactly the same size. Strip off the top spit and throw it on the first heap. Dig the remaining layers into the first trench. Then mark off the third strip. Throw the top spit into the first trench; this will fill it up. The work is continued in this way to the end of the plot. Then begin the other half at the end where the first was finished, throwing the soil from the first trench into the last two. The top spit from the second trench will finish off the last trench in the first half. When the last trenches are thrown out the heaps of soil first thrown out will finish the job, there being enough subsoil to fill one trench and top soil to finish the two. It is to be understood that as the work proceeds manure and any suitable material obtainable is to be put in below every layer. Stable manure is the best material of all. In the lower trenches, however, any kind of garden rubbish—tussocks of grass and anything of a vegetable nature, with the exception of sticks—is useful. Wood, or woody trimmings from hedges, &c., should be excluded, as they breed insects and fungus. The first trenching is necessarily a slow process, but after that, the soil being loose, it is easily shifted, and trenching is comparatively easy.

The question of an edging for paths naturally crops up. The best edging for the purpose is bricks—not bats, but whole bricks. Bats, being broken, hold too much soil between them, and weeds are sure to be troublesome, unless, indeed, the bricks were set in cement, and if that were intended it would be better to use whole bricks, when cement would not be required. The bricks should be laid so that one edge is the highest part, not to show a flat top; nearly all the brick should be buried in the soil, so that the narrow side of the brick would show on the path side and only about one inch on the garden side. Thyme is often used as an edging, and answers very well if it is kept well trimmed. If it is allowed to spread it makes a shelter for slugs, wood-lice, &c. The best variety for the purpose is the variegated sort, known as lemon thyme. Thyme can be raised from seed sown in boxes, from cuttings of young shoots in spring under glass, or by pulling old plants in

pieces and planting rooted bits. Common lavender makes a nice edging if the right strain is obtained; plants raised from seed vary very much in habit, and rarely is a suitable plant obtained in that way. The correct thing is a plant with very small leaves, very numerous branches, very dwarf, and compact in habit. When the right plant is secured it may readily be increased by breaking off small shoots with a heel of old wood and dibbling them out in the open ground. If the work be done during spring the pieces should all grow. Box edgings are frequently met with, but seldom in proper form. A badly made box edging is not a pleasant thing to see, and an overgrown one is a harbour for snails and slugs. When properly laid and kept, however, nothing else looks so well as box. There are two ways to make a box edging, and either would give good results. One is to plant the true dwarf Dutch box. The true dwarf box has very small leaves, very slender and short branches, and a very dense tufted habit; it never makes a tree. If cuttings or plants are put in singly 3 in. or 4 in. apart it will make a good edging. The true dwarf box is, however, very scarce. When ordinary box is used a very different plan must be pursued to obtain a satisfactory edging. In this case you will be dealing with a subject whose natural habit is to make a tree. The natural habit must be overcome, and that can be done only by starving the plant. To do this cuttings should be used in preference to rooted plants, because they can be put closer together, and they can hardly be put too close. Prepare a lot of cuttings 5 in. or 6 in. long. There is no need to take off any of the leaves, simply cut off to the required length. To prepare the ground for their reception draw a line along the edge of the path. Then with a spade throw out a narrow trench about 4 in. deep on the border side of the line. Be sure to throw all the soil on the border. Now start at one end of the trench and lay in a bunch of cuttings, about half a dozen or so. Lay them in a slanting direction, heads from you, letting the cuttings lie tight against the path side of the trench. Pull in enough soil to keep them in position. Lay the next handful close to the first, and continue so throughout, so that when finished there is a dense unbroken row of cuttings. When all are in, and before drawing in more soil, take a fencing-rammer and ram the soil down hard. Next get the hedging-shears and clip the tops, so as to leave the edging shaped like a thick rope. Sweep the clippings off the path; most of them will probably have fallen into the trench, and may be left there. Now draw in the remainder of the soil, levelling it off properly with a rake. The edging will now have a finished and very neat appearance, being only about 1½ in. to 2 in. high. It will require no clipping for

about a year, for though all the leaves will be retained the cuttings will root very slowly, and very little growth will be made for a long time. Edgings so laid may be kept in good condition for years and still be only about 3 in. high. They are very strong, not easily injured, and afford no shelter for vermin. When box edgings are wanted around paths in the flower-garden these are the kind that are most pleasing.

Current Work.

Asparagus should be cut down when the tops are turning sere, before the berries fall to any extent, yet I would rather have a few berries on the bed than cut too soon. The object of cutting before the berries fall is because they are liable to spring up like weeds. I have never found the young plants much trouble. When the tops are cleared off give the bed a mulch of good stable manure. Raised beds are not so common as they were years ago, but some still exist. These should have as much as possible of the loose soil raked off into the alleys before the manure is put on. By and by, before it is time for the heads to appear, the soil now taken off is to be thrown up on to the manure, which by that time will have gone down very considerably.

Seakale may be forced at any time now. Before covering take steps to rid the soil about them of slugs or other insects by dusting with lime and soot. If seakale is wanted for any special date, allow a fortnight after covering with good fermenting manure.

A small sowing of *turnips* may be made with prospect of a successful crop, but do it soon.

Carrots and *parsnips* may be taken up and put in heaps, after cutting off the tops, and covered with straw with soil on top, but they are better in the ground, and should be left there unless there are urgent reasons for lifting them.

Small Fruit.

Raspberry and gooseberry plantations should now, if possible, be given a top-dressing of stable or farmyard manure, but, failing this, do not give artificial fertilizers at this time.

If *Cape gooseberry plants* in their first year should be cut down by frost, do not cut off the tops; leave them on till the new growth appears in spring.

Strawberry-runners should be taken up and planted out in a piece of rich soil. The young plants may be put in rows about

4 in. or 5 in. from plant to plant, with just room for a hoe between the rows.

The Flower-garden.

This is an excellent time for making any alterations that may be desired, because most things can now be transplanted. Lawns may be sown down except where much frost is expected. New work may be undertaken with advantage, working on the lines laid down for trenching the vegetable-garden. Borders that have been stocked for years with flowering-plants are apt to become poor, and the subsoil gets in bad condition. The presence of permanent shrubs may make it awkward to trench. This can be done, however, with management, leaving the shrubs standing and working around them as close as possible. They will eventually derive as much benefit from the trenching as will other things to be hereafter planted.

Roses may be transplanted now with good effect. This is, in fact, the best time to do it, for they become re-established before winter sets in, and start away in spring as well as if they had not been moved. It should be understood that they must not be pruned at this time, but straggling branches may be cut off, and as much top-hamper as may be deemed advisable, to enable the bushes to stand after being replanted. In some instances it may be necessary to give them the support of stakes. After taking the plants up, take care to cut all damaged roots with a sharp knife or good seccateurs, for any bruised or broken root that is planted will be sure to decay, to the detriment of the bush.

Primroses and *polyanthus* may be divided and transplanted. *Violets* should not be disturbed. The proper time to plant them is in spring, immediately after flowering. This proviso may, however, be made: though it would be wrong to disturb an established bed at this time, and would impair its flowering capabilities next spring, still it would not hurt to lift plants that are growing singly, such as nursery stuff prepared for sale. The main fact, however, remains as stated—success seldom follows autumn planting.

Carnations and Picotees.—In places where the spring is likely to be dry and to be followed quickly by hot weather, or in places that lie high and enjoy perfect drainage in winter, being on that account liable to get dry early, it is best to plant in autumn. The soil should be well trenched, and plenty of manure put in low down where the roots will not reach it until the rankness has left it. If the soil is old it will be an excellent thing to add some

C. E. C., photo.]

new in the way of top spit from an old pasture, and if some old plaster and mortar rubbish can be added, so much the better.

Look carefully after young seedlings raised as previously advised. All seedlings should be pricked off as soon as they can be handled. When they are allowed to become crowded they draw up leggy, and seldom thereafter make thrifty plants.

HALF-LONG WHITE VIRTUS TURNIP.

The illustration is that of the Half-long White Virtus turnip, a fast-growing variety of high quality for table use, having a distinctive and very pleasant flavour. It can be recommended for any grower, whether of large or small quantities. It has proved very successful at the Moumahaki Exderimental Farm this season. —*J. Freeman.*

There is in America a little society for the advancement of the local methods of agriculture called the Wisconsin Experiment Association, composed of nearly fifteen hundred young farmers. It is said to be doing excellent work in better methods of farming in its State. Recently over seven hundred members formed themselves into a group called the "Alfalfa Order," with the object of encouraging and assisting in a mutual way the more successful growing of lucerne. The membership fee is only 1s. per annum. During the past year it purchased 88,000 lb. of carefully selected and inspected alfalfa-seed, which was distributed to members at the least possible cost. Excellent rules for the guidance of members and for the successful extension of lucerne have been drawn up, and members are invited to communicate with the Madison Experiment Station for any further information desired.—*Hoard's Dairyman.*

ANSWERS TO CORRESPONDENTS.

CORRESPONDENTS are requested, when desiring information through the Journal in regard to disease in animals and plants, to forward, where possible, affected specimens, in order to facilitate a correct diagnosis of the trouble and to ensure the best advice. In stating a question the most complete descriptive details should be furnished.

Correspondents desiring information in regard to manurial treatment of soil are requested to fill in and forward the prescribed form—"Application for Advice as to Manurial Treatment of Soil"—obtainable from any office of the Department in the Dominion.

In every instance a question to which an answer is desired in these columns must be accompanied by the full name of the inquirer, not necessarily for publication, but as a guarantee of good faith.

Stocking Bush Country.

C. E., Orepuki, Southland :—

I have 25 acres of bush burnt and sown, and the grass is coming on well. What is my best policy as regards stocking? I am advised to feed off with calves or yearlings at once. Some, again, advise waiting until spring before stocking. Will you kindly advise me what course is best in order that the grass may be conserved?

The Fields and Expermiental Farms Division :—

We advise feeding off with yearlings at once. This will tend to strengthen the roots and consolidate the land.

Bluestone.—Foot-rot in Sheep.

Messrs. O'Donnell Bros., Hauturu, Kawhia :—

1. Are there different qualities in bluestone? If so, what is the difference?
2. Should the best quality be used for treating foot-rot in sheep?

The Agricultural Chemist :—

1. Bluestone (hydrated copper sulphate), which should be of a deep-blue colour, is sometimes adulterated by the addition of sulphate of iron (ferrous sulphate), which is green in colour. The colour of the sample is, therefore, some index to its purity.

The Live-stock and Meat Division :—

2. Yes.

Tomato-culture.

T. W., Auckland :—

What can be done to prevent the blossoms falling off my tomatoes instead of setting? See sample herewith.

The Orchards, Gardens, and Apiaries Division :—

Some information as to the general line of treatment adopted would be required before a satisfactory reply could be furnished as to the reasons why the blossoms have fallen off the tomatoes instead of setting. If T. W. will send his address to the Division of Orchards, Gardens, and Apiaries, the Orchard Instructor for the district will call and make further investigation.

Onion-growing.

"Amateur," Blenheim :—

I have about three-quarters of an acre of stiff loamy soil. Two years ago it had potatoes in it, and last year it was sown down in clover. I propose sowing onions in it this year. Could you tell me the best variety for sale purposes? What manure should they have, and what quantity?

The Orchards, Gardens, and Apiaries Division :—

Brown Globe, Golden Globe, James's Keeping, and Brown Spanish are all excellent late-keeping varieties of onions.

Before harrowing apply about 2 cwt. to 3 cwt. of superphosphate per acre. The seed should be drilled in, allowing about 2½ lb. per acre. The drills should be about 15 in. apart to allow room for cultivating. They may be as close as 12 in. if they are hoed by hand, as is frequently done. Thinning must be done as soon as the plants are strong enough to pull out easily.

Apple-scab.

"Apple," Feilding :—

There is some kind of disease affecting my apple-trees, and I am enclosing enough to show what it is. In addition, many of the apples are more or less cracked. Would you kindly tell me what it is; and what must be done to prevent it; and when it requires doing? I suppose some sort of spray is required; but I know nothing of fruitgrowing, and so need information.

The Orchards, Gardens, and Apiaries Division :—

Judging by the specimen forwarded, the apples have evidently been severely attacked by scab (*Fusicladium dentriticum*). In order to prevent attack by this fungus the trees should be carefully and thoroughly sprayed with the Bordeaux mixture, winter strength, when the buds show signs of swelling, and again once or twice, as may be required, with the summer strength of same mixture after the fruit has set. A leaflet on the preparation of spraying-compounds can be obtained on application to the Department.

Eradication of Docks.

Mr. R. N. Greig, Kuhu Bank, Ohau :—

1. I have a 6-acre paddock in which the docks are very bad. Could you advise me how to treat it in order to rid me of these weeds? The soil is clay loam to about 1 ft. 3 in. down, then a layer of sand 3 ft. 6 in., and then gravel. The paddock is damp in patches. Some years ago it was sown down with a mixture of oats and grass, and that season was cut. Since then nothing has been done but graze it. Now the paddock is growing mostly docks and rye-grass. This summer a crop of hay was taken off, but as the docks were so very bad the hay is of little use.

2. After the docks have been eradicated, would the paddock, especially in the damper places, be suitable for the cultivation of lucerne?

The Fields and Experimental Farms Division :—

1. The best method of eradication would be first to drain the area well, especially the low spots, and then to cultivate well, using drilled crops for this purpose. The late-sown drilled crops, especially rape, are more effective than those sown earlier in the season. Before the crop is sown the weed can be checked considerably by going frequently over the field with a broad-shared cultivator, which will cut the plants an inch or two beneath the surface; but, as the roots are tough and strong, it may sometimes be necessary to use the plough to cut them. Early in January the land may be sown with rape in drills, kept clean, or nearly so, by the horse-hoe or more or less hand-hoeing. It may be necessary to put another drilled crop on the following spring, but much depends upon the timeliness, regularity, and thoroughness with which the hoeing is done.

2. Provided effective drainage be carried out, also liming, the land should be suitable for lucerne.

Sorrel.

Mr. F. J. Liley, Motueka Street, Nelson :—

I had a piece of land about a quarter of an acre square which was always full of sorrel. This was a great nuisance. It did not matter how much I dug or forked it, it still came up. So I got some gas-lime and put a lot of it on the sorrel. In a short time the sorrel disappeared. I left it for a time, but could not grow anything on the ground. I dug the ground once more, and, to my dismay, the sorrel came up again, but not so thickly. I then forked it up, and when the young sorrel came again it looked as if it had a disease. I then got about a bushel of quicklime and dug it in, and the sorrel has gone for ever. Was it the gas-lime or the quicklime that did away with the sorrel ?

The Agricultural Chemist :—

Both the gas-lime and the quicklime would have a destructive action on sorrel. For an account of the sorrel question, see article in the *Journal*, December, 1913, p. 591.

Lucerne.

Mr. William Bolton, Opotiki :—

My lucerne is badly affected with leaf-spot. Would the burning-over of the plot effect a remedy ? My last cut I raked into windrows. It rained for four days. When the water had dried out of it I put it in the shed. Was the lucerne of any value ?

The Fields and Experimental Farms Division :—

Lucerne leaf-spot (*Pseudopeziza medicaginis*) is the most serious lucerne-disease in New Zealand. In certain localities it is not troublesome, but in others it often seriously retards the growth, and may more or less completely defoliate the plant. Its effects are most severe when some check to growth occurs, and after the period of blossoming.

So far as pastured paddocks are concerned, the disease does not occasion any loss, and pasturing should always be carried out during a portion of the year in districts where leaf-spot is prevalent. In such cases the paddocks are stocked when the growth is young and before the leaf-spot has had time to develop. Where the lucerne is used for the production of cut green feed frequent mowings should keep the disease in sufficient check to obviate any serious results. Where the crop is for hay it should be cut as soon as leaf-spot becomes at all bad, even if not in the proper stage for haymaking. In such cases it may be preferable to turn it into silage rather than attempt to cure it for hay. When a crop is seriously affected no time should be lost in cutting and saving it for winter feed. A great many of the leaves will fall to the ground, and the stalks are likely to be woody if cured into hay, but mixed with material harvested under good conditions it can be used for winter feed, and if not too devoid of leaves may be fed by itself. Immediately after cutting, the field should be sprayed with 3-per-cent. copper sulphate (3 lb. to 10 gallons), using about 30 gallons to the acre. This treatment arrests the development of the spores on the fallen leaves, which act as the infection centres of the next crop of herbage that will be produced. Burning after cutting has also been advised, and on heavy ground where the lucerne has been established for some years gives good results ; but on light ground, and where the plants are young, serious injury may occur, especially if the crop just taken off has been a hay or seed one. It is, therefore, considered that spraying, although laborious, is preferable to burning over the paddock. As time goes on lucerne will become more and more recognized as our premier green feeding-off crop, and then the complaints against leaf-spot will become more or less a thing of the past. In districts where leaf-spotting causes defoliation lucerne should not be grown for seed, as the quality suffers. In fact, I think leaf-spot is the cause of much of the inferior Asiatic seed which is so often found on the market. The Department, recognizing that leaf-spot is probably the most serious bar to the cultivation of lucerne in certain districts of New Zealand, is devoting special attention at the experimental farms to selection of varieties showing resistance to the disease. It is appreciated that the control of farm-crop diseases should be in the direction of growing immune forms rather than the employment of laborious and recurrent methods of treatment

Fodder Crops.

Mr. Cecil Brooke, "New Chum," Kaikoura :—

I have a small paddock (about an acre) of light soil, which is now carrying a crop of potatoes. It will be ploughed shortly and prepared for sowing. What would you advise me to sow in it for winter and early-spring feed for three or four cows, which will be in milk all the winter ?

The Fields and Experimental Farms Division :—

The area being small, it is presumed that it is proposed to cut and cart out to the cows.

The following might be sown on three-quarters of an acre: 2½ bushels of Russian barley or black winter barley, 1½ bushels black Scotch tares. The balance, quarter of an acre, could be sown with 5 lb. of prairie-grass and 5 lb. Western Wolths grass. The former would give a large amount of feed during the winter, and could be cut and carted off, or fed off. The latter would be a change of feed, and would produce a large amount of early-spring feed, and could be retained for cutting or pasture for two or three years.

Lucerne and Soil-bacteria.

"Cockatoo," Kohukohu, Hokianga :—

Are the small knobs on clover-roots the same as those required for the successful growth of lucerne, and can it be taken as a sign that lucerne will thrive where such clover was ?

The Acting-Director of the Fields and Expermental Farms Division :—

The small knobs or tubercles on clover are caused by minute bacteria, chiefly *Bacillus radicicola*. These bacteria penetrate through the root-hairs into the cortex of the root, and produce characteristic tubercular growths. These become filled with a bacterial mass, consisting principally of swollen bacterioids and bacteria that have retained their normal size. The former seem to be consumed eventually by the host plant, while the latter remain in the soil after the disintegration of the tubercles and provide for future infection of fresh roots. The bacteria are supplied with all the necessary carbo-hydrates by the host, and in return they benefit the plant by providing a steady supply of nitrogenous material, derived in the first place by the fixation of the free nitrogen in the air of the soil. It is considered that there are a great many specialized forms of these bacteria that form tubercular growths on the roots of leguminous plants, and that it is necessary in many cases to provide the special form to infect the type of plant that is to be grown.

With regard to lucerne, special stress is always laid on the fact that soil from an established lucerne-field is necessary to secure good results. For my part, I consider that any soil that grows red clover well, and where nodules are abundantly produced, is suitable for lucerne without any soil-inoculation being undertaken, and I rank thorough cultivation and weed-control as far more important factors in the successful establishment of lucerne. The whole of the lucerne-fields of Marlborough have been established without any soil-inoculation, and the same can be said of nearly all the lucerne in New Zealand. It is probable that the bacteria, after they have entered the host, become specialized, and when afterwards in a free condition in the soil can infect any leguminous plant. Otherwise, it seems peculiar that an ordinary new vegetable-garden should contain all the special bacteria that are said to be necessary to infect the various leguminous crops which are grown under such a condition.

Pig-breeding.—Cow-pox.—Greasy Heels in Horses.

"Beginner," Puketiro :—

1. What is the age that a boar can be used for breeding purposes ?
2. What artificial food, and in what quantity, do you recommend for pigs which have a good quantity of separated milk ?

3. I have a cow which, soon after calving, got thick, hard, yellow scales on her teats. They caused her great pain when touched, and I had to leg-rope her and let the calf suck her. After the calf had taken all the milk I put castor-oil on her teats. I was told it was the cow-pox. When squeezed the scales cracked and bled a little between the cracks. What treatment could be used to prevent this increasing in its early stages?

4. I have an old horse (aged about fifteen) who has had greasy heels for some three years. He was very poor when he got them, but is in good condition now. Do you think he could be cured, as they are bad? What treatment do you recommend?

The Live-stock and Meat Division:—

1. About eight months, taking the generality of pigs.

2. The bulletin on "Pig Breeding and Management" issued by the Department has been forwarded you.

3. Yes, the condition is evidently cow-pox. No treatment can cut short the condition in the early stages. Cow-pox runs its course within relatively fixed periods according to the development of the pustules, the dried crusts generally separating after the twentieth day. The crusts in bad cases might be dressed with a little boracic ointment. The milk should also be removed with a teat-siphon if the hand causes much irritation. See that the siphon is kept thoroughly clean and boiled for five minutes before insertion. It is better to isolate the cow, or, at any rate, milk her last, so as to prevent the disease spreading to other cattle; also wash your hands in some disinfectant solution, and take care you do not get vaccinated yourself.

4. I am afraid that you have very little chance of getting your horse right at his age, and especially as he has had the disease for some three years. In all probability there is much thickening of the skin, with grape-like formations. You might try dressing him with the following lotion once daily: Sulphate of zinc, sulphate of copper, and acetate of lead, of each 1 oz.; camphor-water, a pint and a half. This may be useful if there is any fetid discharge.

Spineless Cactus.

Mr. Fred Smith, Wakatu Post-office, Nelson:—

Will you kindly inform me as to the value of spineless cactus as a fodder for all kinds of stock? I have read that on several tests being made in the United States it was proved that this cactus was equally as good as lucerne in the production of milk, and in some instances superior, and that no other fodder plant is known to contain so much of the salts found in milk—sodium, potash, and magnesium.

The Fields and Experimental Farms Division:—

So far as is known, this plant has not been grown in New Zealand. We have therefore no practical knowledge of it. As it is a "made" plant, great care should be taken in sowing or introducing it, as there is the danger that it may revert to some objectionable type and become a pest. Mr. B. Harrison, F.L.S., Burringbar Post-office, New South Wales, Australia, has published an article on it. If communicated with, he might give you definite information regarding it. It is observed that in some of the States in Australia legislation is being advised to prohibit the introduction of this plant, for the reason that it may revert to some objectionable form.

Grazing Dairy Cows.—Eradication of Rushes.

"Cockey," Foxton:—

1. Which is the best grass for milking; also the best varieties to sow in order to have one coming in when the other is done?

2. Could you give me a remedy to do away with rushes without draining, or stop them from growing, as rushes seem to be a great trouble here?

The Fields and Experimental Farms Division :—

1. The best results—quantity and continuous milking—from the dairy herd at Weraroa has been from a mixture of Italian rye, cow-grass, alsike, and white clover. No other grasses can take the place of these, provided the soil and climatic conditions are favourable. It could be supplemented during January and February with Russian barley and tares, Italian and prairie grass, or silver-beet.

2. Drainage and good cultivation following is the best means of doing away with rushes. Cutting and burning will lessen the evil for a time only. If the land is not too wet, and is ploughable, Duncan's swamp-plough with wide share would do good work. Plough about 3 in. deep and 18 in. wide; this would cover well. Grasses suitable for soil and climate could then be sown.

Maize.

"Beginner," Puketiro, Otago :—

Do you think maize would grow in this district (Catlins) ?

The Fields and Experimental Farms Division :—

Maize has been successfully grown as far south as Balclutha, and it is probable that in favoured localities it would succeed in the Catlins district. It is intended to carry out experiments with maize and millet during the coming spring.

Thistles on Lawn.

"Tam," Tomoana, Hawke's Bay :—

I have a lawn which at present is a mass of thistles. It was put down last year, and I got a good strike of grass (fiorin and fescue); but when the dry weather came on the grass dried up and the thistles appeared and the lawn is now overrun with them.

1. Will the thistles die out in the natural course of events provided the lawn is kept closely mown, or will I have to dig them out ?

2. I have read recently that kainit has been proved to be a good weed-destroyer. Would you recommend its use on my lawn ?

The Director of the Orchards, Gardens, and Apiaries Division :—

1. Thistles will die out in the natural course of events.

2. I think you will find the use of basic slag to be preferred to kainit. As a weed-killer kainit would have to be applied in such quantity as would be injurious to many other forms of plant-life.

Lucerne in the Orchard.

Mr. Thomas Todd, Blythswood, Waimata Valley, Gisborne :—

I was thinking of laying down lucerne in my orchard. The trees are so big now that it is no use trying to grow vegetables under them, and I understand lucerne does not poison trees the way grass does. Could you give me a few hints ? My soil is light, on the top of a little flat-topped knob, but the subsoil is good—papa formation—and the trees are doing very well.

The Orchards, Gardens, and Apiaries Division :—

The laying-down of an orchard in lucerne cannot be recommended, on account of the fact that lucerne would so rob the soil of moisture and plant-food that the trees would suffer severely.

Preserving Milk-samples.

"Inquirer," Sherwood Downs, South Canterbury:—

Recently I wished to have a sample of milk analysed by the departmental Chemist in Wellington, but I did not know how to preserve it and where to get a suitable bottle, there being no creamery in this district. Could you inform me?

The Dairy-produce Division:—

Samples of either milk or cream forwarded to the Director of the Dairy-produce Division, Wellington, are tested for butter-fat free of charge. It is imperative, however, that such samples should be thoroughly representative of the bulk from which they are taken, and this can be assured by efficient stirring before the sample is taken and placed in the bottle. Any small bottle containing from 4 oz. to 8 oz. is suitable for the purpose, and care should be taken to see that it is filled right to the neck, so as to prevent the agitation which takes place in transit, causing the separation of the fat. In order that the sample may reach the testing officer in the best condition possible, it is advisable to add to it from 3 to 5 grains of bichromate of potash, which should be thoroughly mixed with the sample. Three or four drops of formalin may be used in place of the bichromate of potash for preserving purposes.

If "Inquirer" would like a complete analysis of a sample of milk, he should send to the same address as that given above not less than half a pint of milk, taken in the same way as detailed above; but in this case no preservative other than a few drops of formalin should be used.

In all cases where samples are forwarded to the Dairy-produce Division for the checking of dairy-factory tests the sender must have such samples taken and sealed in the presence of a responsible representative of the dairy company concerned. In the past abnormal samples have come to hand for testing, and it has, therefore, become necessary to make this stipulation. It is quite apparent that had the tests of such abnormal samples been sent out the tendency would have been to create dissatisfaction rather than allay it.

Lime.

"Campus," Otaki Railway:—

Would you please let me know what change carbonate of lime undergoes upon being burnt? What are the effects upon the soil of unburnt and burnt lime?

The Agricultural Chemist:—

These questions are dealt with in the article on limestone in this issue of the *Journal*.

STOCK IN QUARANTINE.

The following stock were received into quarantine during the month of March:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
		Somes Island (Wellington).			
1	Collie dog ..	Male ..	London ..	Williams and Kettle (Ltd.)	Napier.
1	,, ..	Female	,, ..	Ditto	,,
1	Yorkshire terrier ..	Male ..	,, ..	F. G. Page ..	Wellington.
		Motuihi Island (Auckland).			
24	Holstein heifers ..	..	Montreal	Gunn and Sinclair	Raetihi.
15	Holstein calves ..	Mixed sexes	Born on voyage	,,	,,

THE HEMP INDUSTRY.

W. H. Ferris.

Apparently many millers and their staffs, especially in the Manawatu district, were encouraged last month to do better work by reason of the improved leaf available. Altogether there is a better appreciation of a sound leaf than was the case in many past seasons. An evidence of this is the decision of the great majority of millers to close their mills this month, in order that new cut clumps may not be affected by the frosts which are usually experienced about this time. Generally the resting of the swamps during the winter will be to their great advantage.

Too many millers have been cutting immature leaf, which has not the strength or body necessary for the production of the best quality of fibre. The failure to give the plant a sufficient rest has a decidedly weakening tendency, and if persisted in will no doubt lead to serious deterioration of the leaf produced or, maybe, will render it useless for fibre purposes. If many of our phormium areas were persistently harvested every two years the plants would undoubtedly die out. Indeed, a three-years rest is often insufficient, though, of course, where good leaf is produced in this time from a particularly vigorous plant it would be well to harvest it. I know of many swamps where the leaf is distinctly inferior to that which was grown there ten to fifteen years ago. A patch of leaf I saw growing the other day in a Manawatu swamp was the best quality I have seen for many years in that environment, but the swamp in which it was growing was clean and well drained, and the leaf was seven to eight years old. The leaf was about 8 ft. in length and was remarkably uniform. When milled, a high-grade fibre was easily dressed from it. Obviously it is impossible to secure good fibre from immature leaf and to maintain the plants in a vigorous condition capable of periodically providing a harvest of high-grade leaf.

Reference has been made in these notes to the mistaken method of some stripper-keepers in forcing too great a bulk of leaf through the machines, leaving too much to the spring of the stripper, thereby bruising the body of the fibre and inducing a "nippy" and "towy" tail. It is gratifying to see that endeavour is being made in several mills to overcome this defect. Fewer leaves are being fed into the machines at a time, and in consequence the

body, instead of being bruised, is providing a better and stronger fibre, and though the tails are of a flaxy nature, this defect can be remedied in the scutching, a good clean tail resulting; whereas with a towy tail any attempt in the scutching to overcome the defect makes the tail worse, while the amount of tow is increased.

One miller in particular who has adopted this more sane method of stripping—conserving the quality of the fibre in the body of the leaf, and at the same time obtaining a better tail—is so convinced of the improvement effected by not overloading the stripper that he intends in the future to rigidly adhere to this method. He now realizes that in striving after quantity quality can easily be lost.

The miller is not to be altogether blamed for the high proportion of low-grade fibre produced during the past season. Diseased leaf has been largely responsible; and when a miller has been working with unsatisfactory raw material for some time it is easy for his staff to get out of its stride, and difficult to come back to a good standard of work when better leaf is available.

In the 1912–13 season—that is, from the year ending the 31st March, 1913 — the amount of "good-fair" exported was 34 per cent., while for the 1913–14 season the proportion was 28·56 per cent. In the previous season the amount of "fair" fibre was 57·71 per cent., while for the past financial year, 1913–14, it was 63·52 per cent. This falling-off in quality was no doubt due more to the poor quality of leaf available than to inferior work in the milling operations.

The British Board of Trade has been informed, through the Colonial Office, that the Governor of Fiji has authorized the payment of a bonus of £500 to the Vesari Sisal Hemp Company for having exported 10 tons of sisal hemp from that colony.—*Board of Trade Journal.*

The Improved Accommodation for Flax-mill Hands on the Motua Estate.

THE FRUIT CROP.

The officers of the Orchards, Gardens, and Apiaries Division report as follows on the condition of the fruit crop at the end of March :—

Whangarei.—Apples : Heavy crops ; late varieties are being harvested. Lemons : Fair crop maturing. Nectarines : Crop finished. Peaches : Late varieties now being marketed. Pears : Plentiful supply ; late varieties now being harvested. Plums (English and Japanese) : Finished. Tomatoes : Only very few to hand, and of poor quality. Oranges : Steadily recovering from effects of last season's drought, and promise a good crop. A welcome rain fell last week, but almost too late to be of any great benefit to the fruit crops here. Leech has given a good deal of trouble, more especially on plums, and when the crop is off growers seem to take no further care to ward off attacks from pests or disease of this kind.—*J. W. Collard.*

Auckland North.—Apples : In fair supply ; prices rising. Lemons : Trees promising well. Nectarines and peaches : Crop practically over. Pears : In fair supply ; *fusicladium* prevalent, through inclement spring. Plums (English and Japanese) : Crop practically finished. Tomatoes : Crop nearly finished.—*W. C. Thompson.*

Auckland South.—Apples : Rain was badly needed, which fell about the middle of the month, and the quality of the crop of late apples is now assured ; picking of Northern Spy is now in full swing ; there are exceedingly good crops of this apple, and prices are high. Lemons : Crop good. Nectarines : Crop finished ; high prices maintained throughout. Peaches : Practically all finished ; the late varieties realized high prices. Pears : Crop good. Plums (English and Japanese) : All finished. Strawberries : Rain in the middle of the month very beneficial, as on account of dry weather runners were not rooting at all well, and instead of gathering food for themselves were drawing upon the parent plant, which were feeling the effects of same. Tomatoes : Supplies lately have been falling off, but should increase during the next couple of weeks, as will feel the benefit of the rain ; the weather is also favourable, being still warm.—*N. R. Pierce.*

Hamilton.—Apples : Harvest in full swing ; prices firm ; good lines selling well. Lemons : Scarce ; coming crop looks very promising. Nectarines : Crops all picked. Peaches : Late varieties, fair supply. Pears : In good supply ; prices for good lines very fair. Plums : Almost over. Plums (Japanese) : Practically finished. Tomatoes : Rather scarce at present. Walnuts : Crops are generally very light.—*T. E. Rodda.*

Poverty Bay. — Excellent crop of late apples. 100 cases of apples were shipped from this district to South America, and another 100 cases will be despatched in April. Pears : Late varieties poor. Peaches : Only a few late peaches left. Lemons : Slowly improving. Walnuts : Good. A welcome change in the weather took place this month ; very heavy rain for a number of days, the heaviest, I suppose, for the last two years and a half.—*W. R. L. Williams.*

Manawatu and Wairarapa.—Apples : Later varieties maturing well, and showing good colour ; large crops of Sturmers and Washingtons. Peaches : Almost all gone ; few late varieties being put on the market ; trees attacked with rust during late part of season. Pears : Good crop ; very clean. Tomatoes : Still being picked, although crop small.—*G. Stratford.*

Wanganui.—Apples : Prospects well maintained ; some very creditable lines now being marketed. Apricots, cherries, and gooseberries : Crop over ; trees making sound ripe wood. Lemons : Prospects maintained ; growers beginning to take an interest in properly maturing the fruit for market. Nectarines and peaches : A good deal of "rust" on some varieties, which some growers will do well to watch. Pears : A good crop ; full and clean. Plums (English and Japanese) : Crop over ; trees generally want more "feeding" and Bordeaux-spraying. Raspberries : Doing well, though not much grown. Strawberries : Some late varieties still cropping. Tomatoes : Some very fair outside crops being picked.—*W. C. Hyde.*

Hastings.—Peaches: A limited quantity in cool store keeping well; prices very satisfactory. Apples and pears: Very plentiful crops; quite up to expectations. Owing to recent good rains there will be less small fruit than was expected. Walnuts: Not up to earlier expectations, owing to attacks of blight. Tomatoes: Crops improved considerably after recent rains, although, on the whole, they were not satisfactory.—*J. A. Campbell.*

Wellington.—Apples: Crops looking well; Cox's Orange looking splendid, and good prices are being realized; Jonathan are also looking well; the russeting of the fruit has caused considerable annoyance this year, especially Sturmers; scab and moth have been kept well under control; mildew is fairly troublesome. Apricots: Poor. Pears: Much improvement this year in clean fruit, and a fair average crop. Plums: Poor; about finished. Plums (Japanese): Crop about finished. Tomatoes: Fair crops; prices throughout good. There is still a great deal of fruit to come should the weather keep fine.—*T. C. Webb, jun.*

Nelson.—Apples: Nothing further to add to last report; there are plenty of apples available for export; shippers have no difficulty in filling their orders for export. Peaches: Still a few late sorts being gathered. Pears: Still plenty available; good crops being gathered. Tomatoes: Growers still picking, but owing to continued dry weather the fruit is rather small.—*J. H. Thorp.*

Blenheim.—Apples: Heavy crops; commencing to gather. Apricots: Fruit all gathered. Cherries: Fruit all gathered. Gooseberries: Fruit all gathered. Nectarines: Fruit all harvested. Peaches: Fruit all harvested. Pears: Heavy crop; a few late varieties not gathered yet. Tomatoes: Season almost over. Walnuts: Medium crop; a few being harvested.—*B. G. Goodwin.*

North Canterbury and West Coast.—Apples: Fair crop; late varieties are now being harvested. Apricots, nectarines, cherries, currants, gooseberries: Crops over. Grapes: Indoor, good crop; outdoor, fair crop; mildew rather prevalent. Peaches: Good crop; mid-season and late varieties turning out exceptionally well. Pears: Crop inclined to be light. Plums (English): Fair crop. Plums (Japanese): Crop over. Quinces: Fair crop. Raspberries and strawberries: Crops over. Tomatoes: Indoor, nearly over; outdoor, plentiful. Walnuts: Light; disease rather prevalent; pear-scab and black-spot rather prevalent. Owing to the very wet weather prevailing during the spring it was most difficult to spray thoroughly.—*W. J. Courtier.*

Christchurch and Suburbs.—Apples: Only fair crop; now harvesting freely; choice clean, unblemished fruit rather the exception. Pears: Turning out better than anticipated; some varieties badly infected with black-spot. Plums: Crop about finished. Tomatoes: Outdoors now in full harvest, and turning out fairly well. Walnuts: Poor crop.—*Gordon Esam.*

Timaru.—Jonathans and mid-season varieties now being harvested; general improvement noticeable in the fruit sent to market, as regards packing. Pears: Mid-season varieties being marketed; scab very bad in many varieties. Walnuts: Bacteriosis apparent in this season's crop.—*A. B. Mansfield.*

Dunedin.—Apples: Good crops of excellent fruit being picked; no fruit available for export this season. Nectarines: Crop over. Peaches: Good crops and fine fruit of late varieties being picked. Pears: Good. Plums: Over. Plums (Japanese): Over. Tomatoes: Main outdoor crop over; still a good picking until frosts come. Walnuts: Heavy crops.—*W. T. Goodwin.*

HONEY-CROP PROSPECTS.

The Director of Orchards, Gardens, and Apiaries Division has received the following reports on the apiary prospects from the Apiary Instructors:—

Auckland.—From reports to hand it seems that last month's report of only half crops was correct. The quality this year is good. Prices locally are in advance of those of last season, due to the small crops obtained and to the beekeepers exporting in bulk. First-grade honey in 2 lb. tins is bringing locally from 10s. 6d. to 11s. 6d. per dozen. A small advance shipment of thirty-five cases was graded

and left Auckland for London last month. It is expected that a large quantity will be exported during the present month.—*G. V. Westbrooke.*

Wellington.—The closing of the honey season marks a successful year—not so successful, however, as the previous one. The beekeepers of Poverty Bay and Hawke's Bay have been particularly unfortunate, very little surplus having been secured. The crops in Taranaki and Wellington Provinces are average, and, viewing the returns as a whole, in the opinion of beekeepers prices are likely to remain firm. As yet no honey has been graded for shipment in the provinces mentioned.—*F. A. Jacobsen.*

Christchurch.—The final extracting is almost completed by beekeepers, who are now turning their attention to winter preparations. The crop this year is not so heavy as that of 1913, but owing to the large increase both in beekeepers and apiaries I have good reasons to believe the export trade will show an increase in Canterbury. It is very satisfactory to report that since the inception of the export trade on 31st May, 1913, 89,930 lb. (40 tons 3 cwt.) of honey has been graded and exported from Christchurch up to 31st March, 1914. The whole of this quantity, with the exception of 5 tons, has been gathered within about forty miles of Christchurch. If this quantity can be gathered within such a small area it is hard to say to what extent the export may develop in Canterbury.—*L. Bowman.*

Dunedin.—The season is practically finished. Beekeepers are now busy putting bees into winter quarters and clearing up after extracting operations. The season in Southland has been disappointing, although at one time it looked as if it would be the best for many seasons. Unsettled weather prevented the bees from working the clover, and as a result an average crop has been secured. In North Otago the season has been excellent, and beekeepers report splendid averages. Excellent rains in December refreshed the clover pastures, and a spell of fine weather in January enabled the bees to get busy, and beekeepers had to keep their extractors running to prevent the hives becoming congested. Up to the present very little honey has come forward. It is yet early to state what effect the enforcement of the Pure-food Regulations will have on the sale of honey. Last winter adulterated honey to the extent of several tons was placed on the Dunedin market, and this had a tendency to keep prices down. Producers now hope to have the protection of the Act, so that pure honey will find its way to the consumers. Prices are unchanged—good sections, to 5s. 6d. per dozen; bulk honey, 3½d. to 5d.; beeswax, 1s. 4d. per pound.—*E. A. Earp.*

MARKET CONDITION OF LOCAL FRUIT AND VEGETABLES.

The Fruit Inspectors of the Orchards, Gardens, and Apiaries Division report as follows on the condition of locally grown fruit and vegetables in the shops and auction-rooms, and the market position of these for the month of March:—

Auckland.—The volume of local fruit forwarded during the month has fallen off considerably, and prices have consequently improved slightly. In the beginning of the month the supplies were considerably shorter than usual, and that, coupled with a brisk demand, caused prices to rise. A marked falling-off in the demand, however, brought returns rather low in the latter part of the month, so that, on the whole, though slightly in advance of last month, the values have been rather less than normal for the season of the year. The chief items now being handled are apples and pears, and very fair samples of both are coming to hand. A good demand exists for Cape gooseberries. Tomato supplies and prices are very erratic, but good samples are eagerly sought after at very fair prices. Quinces are getting scarce, and show a marked advance in values. The following prices may be taken as a fair average for the month: Apples, coloured, superior 7s. 6d. to 8s. 6d., good 5s. to 6s.; apples, cooking, 4s. to 5s.; pears, dessert 6s. to 8s. 6d., cooking 4s. to 4s. 6d.; quinces, 3s. to 4s.; English plums, 4s.; tomatoes, 4s. to 5s.; grapes, hothouse, 1s. to 1s. 3d. per lb.; passions, 2s. to 2s. 6d.; local lemons, 6s. to 7s. 6d.—*C. Craigie.*

Wellington.—The markets have been fairly busy during the month. Apples are in fair demand, good lots realizing satisfactory prices. Several buyers in the markets are complaining about the unfair methods in which most of the fruit is being packed. Several lines opened up good on top, but on going through to the centre of the case the fruit was inferior. I must again draw the growers' attention to this method, as a continuation of this packing will lead to the buyers demanding to see every other case opened up. At the present time buyers refuse to buy certain marks on account of the dishonest packing, therefore those who have received low prices will understand. All fruit should be graded; even if it is small it will bring a higher price than a mixed grade. Apples should bring at least 7s. per case; most of it realizes 3s. 6d. per case. Pears are better, although some varieties will not sell well in the Wellington markets; those that are in demand here are Williams's Bon Chretien, Marie Louise, Winter Cole, Winter Nelis, Beurre de Capiaumont, Beurre Clairgeau, and Vicar of Winkfield, for cookers. These varieties are well known to the buyers and public, who rarely take notice of others. The prices vary somewhat during the month; the latest quotations are: Apples (dessert): Cox's Orange, 7s. 6d. to 8s. 6d.; others (good quality), 5s. to 7s.; inferior, 3s. 6d. to 4s.; good cookers, 5s. to 5s. 6d.; others, 4s. to 4s. 6d.; inferior, 2s. 6d. to 3s. per dump case. Pears: Best dessert, 8s. to 9s.; other choice varieties, 6s. 6d. to 7s. 6d.; inferior, 4s. to 5s.; good cookers, 4s. 3d. to 4s. 9d. per dump case. Peaches (dessert), from 3s. upward per half-case; cooking, 2s. to 2s. 3d.; this fruit is improving in price. Tomatoes: Best Hutt, 3s. to 3s. 7d.; others, 2s. 6d. to 2s. 9d.; Nelson tomatoes arriving in bad order, 1s. 6d. to 2s. All vegetables are in fair demand, and the prices are very satisfactory. Special mention may be made of a line of mushrooms from Greytown, 10s. per case, 22 lb. to the case. Potatoes are plentiful. Onions scarce.—*T. C. Webb, jun.*

Christchurch.—The markets were heavily supplied at the beginning of the month; the supply is now normal. Late plums and peaches are coming forward in short quantity. The market is well supplied with apples and pears; the majority of the former are badly blemished, and very few really choice lines are offering. Tomatoes are plentiful and the quality good. Approximate rates as follows: Apples: Choice, well coloured, dessert, 2d. to 2½d. per lb.; medium dessert, 1¼d. to 2d. per lb.; cookers, 1d. to 1½d. per lb. Pears: Dessert, 2d. to 2¼d. per lb.; cookers, 1d. to 1½d. per lb. Peaches, 1½d. to 2d. per lb. for medium, 2½d. to 3½d. for choice. Plums: 2d. to 2½d. per lb. Grapes: 7d. to 9d.; rather poorly coloured. Tomatoes: 1d. per lb. Cucumbers, 1d. to 1¼d. per lb. Onions in paddock, £3 15s. Potatoes in paddock, £2 10s. to £2 15s.—*Gordon Esam.*

Dunedin.—Good supplies of tomatoes leave some forward during the month, but there has been only small lots of other fruits. A few splendid lines of strawberries came to hand from Outram. Apples and pears in good condition. Vegetables are in short supply, and good prices are obtainable for anything in this direction coming forward. Prices for the month ruled as follows: Apples, eating 6s. 6d. to 9s. per case, cookers 1d. to 1¾d. per lb.; pears, 5s. to 7s. per case; plums, 2d. to 2½d. per lb.; nectarines, 2¼d. to 2¾d. per lb.; grapes, 8d. to 8½d. per lb.; peaches, 1½d. to 2½d. per lb., up to 4d. for choice; strawberries, 9¾d. per lb.; tomatoes, 1½d. to 2d. per lb., to 5d. for choice; blackberries, 5½d. per lb.; quinces, 1d. to 1½d. per lb.; cabbages, 5s. 6d. per sack; cauliflowers, 6s. 6d. per sack; beans, 2½d. per lb.; marrows, 4s. 9d. to 6s. per sack; swede turnips, £2 5s. per ton. The shops are fairly well stocked with fruit, which was found in good condition.—*E. T. Taylor.*

Bluff.—The markets have been fully supplied with New-Zealand-grown fruits, comprising plums, peaches, pears, and apples, with a few lines of stove-house grapes. Supplies of tomatoes came well forward, and rates were fair. The consignments of apples from Nelson arriving on these markets call for comment. They were invariably remarkably well graded and packed, some lines of Jonathans attracting special attention. It would be better, however, if less wood-wool was used in finishing off, as it settles in transit, and the fruit shakes as a consequence. One line of six cases of pears from North Canterbury were destroyed for black-spot (*F. pyrinum*). Current prices for March: Apples, dessert 6s. to 9s. per case, cookers 1s. 6d. to 5s. 6d. per case; pears, 5s. to 9s.; quinces, 5s. to 7s.; tomatoes, hothouse 4d. to 5d. per lb., outside 1½d. to 3½d. per lb.; peaches, 1½d. to 3½d. per lb.; plums, 1d. to 3d.; strawberries (late), 9d.; grapes, 9d. to 1s.; potatoes, £3 to £5 per ton; onions, 7s. to 8s. per bag; rhubarb, 1½d. per lb.; cucumbers, 2s. 6d. per dozen; turnips, 2s. 6d. per sack; cabbage, 3s. to 5s. per sack; marrows, 5s. per cwt.—*R. Hutton.*

THE DOMINION'S EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.
January,	1914	231,766	464,185	30,424	33	150,492	136,086	108,742	..	500	2,851	15,234	4,306	11,133
,,	*1913*	*166,714*	*229,179*	*6,886*	*611*	*109,251*	*63,864*	*118,986*	..	*329*	..	*6,969*	*2,215*	*4,110*
February,	1914	354,190	334,207	14,100	3	86,570	59,532	127,372	..	4	..	3,709	633	7,607
,,	*1913*	*326,337*	*403,698*	*12,666*	*64*	*89,098*	*81,733*	*127,968*	..	..	..	*12,520*	*4,295*	*7,973*
March,	1914	446,522	551,313	36,689	..	61,060	62,732	95,175	..	..	..	8,187	2,562	3,958
,,	*1913*	*86,224*	*210,166*	*7,428*	*250*	*47,560*	*59,844*	*49,661*	..	*115*	..	*12,552*	*7,662*	*4,043*
April,	1913	303,937	647,948	16,834	457	11,358	52,934	61,988	..	300	..	9,049	3,351	3,889
,,	*1912*	*213,178*	*355,829*	*7,046*	..	*38,986*	*38,137*	*31,615*	*4,905*	*2,180*	..	*5,134*	*1,958*	*4,458*
May,	1913	418,221	731,520	22,073	100	637	46,304	33,281	..	265	2,000	15,751	5,005	9,057
,,	*1912*	*454,506*	*744,287*	*32,691*	..	*1,441*	*40,535*	*51,833*	*11,157*	*26,569*	*1,500*	*11,963*	*2,826*	*6,287*
June,	1913	315,034	528,815	24,444	588	79	3,166	18,741	..	..	13,072	13,592	4,065	5,439
,,	*1912*	*170,738*	*287,697*	*24,605*	*221*	*558*	*7,712*	*18,138*	*9,100*	*7,622*	*2,039*	*5,646*	*1,168*	*1,213*
July,	1913	215,713	331,353	14,030	..	..	1,687	17,169	5,651	300	9,190	9,682	1,720	10,793
,,	*1912*	*291,097*	*371,474*	*29,457*	*210*	*684*	*1,255*	*16,567*	*44,324*	*23,216*	*20,573*	*7,463*	*1,856*	*5,892*
August,	1913	161,593	178,263	13,129	6	8	407	8,494	11,604	45	38,480	3,714	2,310	6,406
,,	*1912*	*207,239*	*157,589*	*10,478*	..	*559*	..	*10,409*	*42,580*	*38,802*	*19,562*	*3,758*	*523*	*4,219*
September,	1913	133,122	83,521	5,334	16	6,575	2,020	7,176	..	..	16,336	3,826	1,501	10,049
,,	*1912*	*44,657*	*40,759*	*1,174*	..	*8,723*	*1,204*	*6,671*	*15,742*	*17,363*	*19,033*	*2,957*	*501*	*3,671*
October,	1913	14,122	25,735	580	..	42,847	21,452	2,705	..	..	10,020	6,986	3,672	2,923
,,	*1912*	*51,263*	*15,393*	*3,882*	..	*49,962*	*16,389*	*4,647*	*7,952*	*64,480*	*5,395*	*4,193*	*401*	*9,075*
November,	1913	20	1,479	..	..	53,468	23,722	1,891	..	..	2,478	4,162	771	2,314
,,	*1912*	*54,175*	*8,286*	*282*	..	*140,751*	*57,181*	*33,305*	*3,680*	*40,896*	*13,892*	*9,866*	*1,911*	*5,466*
December,	1913	128,087	86,890	8,909	..	249,526	124,821	51,385	..	250	24,479	19,807	5,276	11,273
,,	*1912*	*117,740*	*106,310*	*4,774*	..	*119,885*	*66,213*	*44,789*	*5,868*	*30,490*	*10,070*	*3,816*	*2,613*	*3,686*

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE THREE MONTHS ENDED 31ST MARCH, 1914.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	North Island.	Lamb. Canterbury.	Other than Canterbury.	Beef. Hinds.	Fores.	Butter. New Zealand.	Danish.	Cheese. New Zealand White.	New Zealand Coloured.	Canadian.	Hemp (Spot). New Zealand Good-fair.	New Zealand Fair.	Manila.	Hemp (Forward Shipment). New Zealand Good-fair.	New Zealand Fair.	Manila.	Wheat. Short-berried.	Long-berried.	Oats. Sparrowbills.	Danish.
1914.							d.	d.	d.	d.	d.	d.															
Jan. 3	..	..	..	..	..	..	..	5	6⅜	..	4	4	122/0	133/0	66/0	67/0	69/0	25/10/0	23/10/0	27/0/0	..	..	27/0/0	..	..	..	..
,, 10	..	..	..	..	..	..	..	5	6½	6¾	4⅜	3⅞	120/0	130/0	66/0	67/0	69/0	25/10/0	23/5/0	27/10/0	25/15/0	23/15/0	27/0/0	..	..	..	..
,, 17	..	..	..	..	..	..	..	5⅛	6½	6¾	4½	4	118/0	123/0	65/0	67/0	70/0	26/0/0	24/0/0	28/10/0	26/5/0	24/5/0	28/0/0	..	..	..	..
,, 24	..	..	..	..	..	..	..	5⅛	6¼	7¼	..	..	116/0	127/0	65/0	67/0	70/0	..	..	28/10/0	26/10/0	24/5/0	29/0/0	..	..	..	..
,, 31	..	..	..	..	..	..	..	4⅞	..	6⅞	4⅜	4	116/0	128/0	65/0	67/0	70/0	..	25/0/0	28/10/0	26/10/0	24/5/0	29/0/0	..	..	..	..
Feb. 7	1/3¼	1/3½	1/4¼	1/7½	1/9¾	2/3¼	..	4¾	..	6⅝	4½	4	116/0	126/0	64/0	66/0	72/0	25/10/0	23/0/0	28/5/0	26/0/0	23/15/0	28/10/0	..	..	..	..
,, 14	..	..	..	..	..	..	..	4⅝	..	6½	4½	4	116/0	123/0	64/0	66/0	72/0	25/10/0	23/5/0	28/0/0	25/15/0	23/10/0	28/5/0	..	..	..	..
,, 21	1/3¾	1/4	1/4¾	1/8	1/10¾	2/4	..	4⅞	..	6½	4½	4	116/0	124/0	64/6	66/6	72/0	25/5/0	23/0/0	27/5/0	25/15/0	23/5/0	27/10/0	..	..	..	..
,, 28	..	..	..	..	..	..	..	4¾	..	6⅝	4½	4	118/0	126/0	64/6	67/0	72/0	25/5/0	23/0/0	27/0/0	25/10/0	23/5/0	26/10/0	..	..	..	..
March 7	..	..	..	..	..	..	..	4½	..	6⅝	4½	4	116/0	126/0	64/0	65/6	72/0	25/5/0	22/10/0	..	25/15/0	22/15/0	..	..	..	..	..
,, 14	..	..	..	..	..	..	..	4½	6½	6¼	4½	4	114/0	124/0	63/6	65/6	71/0	25/5/0	22/15/0	26/10/0	25/15/0	22/15/0	26/10/0	..	..	..	..
,, 21	..	..	..	..	..	..	..	4½	6⅜	6¼	4½	3⅞	112/0	124/0	63/0	65/0	71/0	25/10/0	22/10/0	27/0/0	25/15/0	23/0/0	26/10/0	..	..	..	..
,, 28	..	..	..	..	..	..	4⅞	4½	6¼	6⅛	4½	3⅞	112/0	124/0	62/6	65/0	71/0	26/0/0	23/0/0	26/10/0	..	..	26/10/0	..	..	..	..

HEMP AND TOW GRADING RETURNS.

MARCH.

Hemp.—The total number of bales graded was 14,455, as compared with 17,553 for the corresponding month of last year, a decrease of 3,098 bales. For the twelve months ending 31st March, 1914, the number of bales graded was 160,249, as compared with 120,542 for the previous twelve months, the increase being 39,707 bales.

Tow.—During the month 4,484 bales were dealt with, as compared with 6,439 for the corresponding month of last year, a decrease of 1,955 bales. For the twelve months ending 31st March, 1914, the number of bales graded was 52,213, as compared with 40,933 for the previous twelve months, an increase of 11,280 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF MARCH, 1914.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	213	964	1,048	240	..	51	2,516
Napier ..	..	..	173	36	..	..	..	..	209
Foxton ..	..	..	1,165	2,337	459	92	57	..	4,110
Wellington ..	..	20	2,141	2,601	450	54	4	..	5,270
Blenheim ..	..	49	98	..	..	..	..	..	147
Picton ..	..	94	74	108	..	..	..	..	276
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	158	240	..	..	..	..	398
Bluff	..	..	481	779	243	25	1	..	1,529
Totals ..	..	163	4,503	7,065	2,200	411	62	51	14,455
Percentages of totals	..	1·13	31·15	48·88	15·22	2·84	0·43	0·35	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	188	761	102	1,051
Napier	..	20	..	..	20
Foxton ..	124	631	131	12	898
Wellington ..	142	679	398	8	1,227
Blenheim ..	67	20	..	..	87
Picton	7	91	59	..	157
Lyttelton ..	..	40	129	..	169
Dunedin ..	..	42	85	..	127
Bluff	..	218	486	44	748
Totals ..	340	1,929	2,049	166	4,484

Stripper-slips.—Passed for export: Auckland, 10; Foxton, 74; Wellington, 48—total, 132. Condemned: Foxton, 12; Wellington, 7—total, 19.

NEW ZEALAND-SAN FRANCISCO TRADE.

Following are the shipments of produce for San Francisco, Tahiti, and Rarotonga, and transhipments for Vancouver from New Zealand, since December last:—

—	"Aorangi," 5th Dec.	"Tahiti," 7th Jan.	"Moana," 30th Jan.	"Aorangi," 27th Feb.	"Tahiti," 27th March.
Gum, packages	57	6	44	16	8
Seeds, sacks	..	184	..	..	34
Grain, &c., sacks	83	148	250	33	48
Meat, cases	616	896	431	1,299	261
Onions, cases	2	5	6	8	11
Potatoes, sacks	6	42	20	25	22
Sundries, packages	1,825	1,891	469	47	229
Butter, boxes	5,815	10,819	2,702	9	7
Hemp, bales	..	..	100	131	484
Frozen lamb, carcases	4	502	2	4	4
,, mutton, ,,	.	..	..	..	..
,, veal, ,,	..	..	..	..	94
,, beef, quarters	..	..	..	..	500
,, sundries, packages	..	..	..	..	..
Timber, pieces	..	..	..	..	..
Fresh fruit, cases	..	..	..	698	9

NEW ZEALAND-VANCOUVER TRADE.

Following are the shipments of produce for Vancouver and North American ports from New Zealand since November last:—

—	"Marama," 22nd Nov.	"Makura," 24th Dec.	"Niagara," 17th Jan.	"Marama," 14th Feb.	"Makura," 14th March.
Butter, boxes	17,009	23,698	20,076	17,406	12,131
Mutton, carcases	1,450	..	1,000	100	25
Lamb, ,,	..	10	1,000	..	186
Beef, quarters	..	990	1,933	652	421
Veal, carcases	285	362	877	402	36
Frozen sundries, packages	55	12	..	33	143
Wool, bales	28	6	17	2	104
Grass-seeds, beans, &c., sacks	2	8	42	..	24
Hides and skins, sacks, &c.	2,947	709	2,083	2,551	1,320
Onions, cases	..	..	4,750	2,500	12,026
Sheep-skins, bales	..	..	130	161	..
Jam, cases	101	40	135	89	128
Sundries, packages	2,183	172	1,518	219	99
Potatoes, crates	..	..	..	38	..
Kauri-gum, packages	300	330	303	300	328
Hemp, bales	129	13	..	..	..
Rabbits, crates	..	..	..	300	..
Timber, pieces	468	..	3,450	66	2
Eggs, cases	..	20	..	1	..
Meats (canned, &c.), cases	52	7	1,605	30	503
Fertilizers, sacks	..	..	..	..	..
Fresh fruit, cases	..	..	..	..	7

STEAMSHIP SERVICE TO EASTERN PORTS OF UNITED STATES.

A NEW steamship service has been inaugurated between New Zealand and the two principal ports on the eastern seaboard of the United States of America, New York and Boston, by the New Zealand and African Steamship Company. The s.s. "Banffshire," which sailed from Wellington on 19th March, inaugurated the service. This steamer will be followed at intervals by other vessels. The following cargo was carried by the "Banffshire":—

	Boston.	New York.
Hemp (bales)	1,292	256
Tow (bales)	171	..
Pelts (casks)	120	261
Peas (sacks)	90	..
Hides (sacks	312	634
Gum (packages)	..	1,091
Wool (bales)	291	..
Sundries (packages)		21

STOCK EXPORTED.

THE following table shows the numbers and descriptions of stock exported from the Dominion during the month of March:—

Port of Shipment.	Horses.			Sheep.			Cattle.			Pigs.		Dogs.		
	To Australia.	To Great Britain.	To Pacific Islands.	To South America.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To Montevideo.	To Australia.	To Pacific Islands.	To Australia.	To Pacific Islands.	To London.
Auckland ..	8	..	21	..	..	210	..	36	..	..	20	8	1	..
Gisborne ..	4	..	..	..	..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	5	..	..	..	..	..	..	..
Wellington	18	..	..	..	297	..	2	..	..	..	..	9	..	..
Lyttelton ..	8	..	..	..	13	..	9	..	..	..	..	..	..	..
Dunedin ..	17	..	..	..	..	..	..	..	..	..	..	4	..	..
Bluff ..	10	..	..	40	..	..	..	..	..	..	..	..	..	..
Totals ..	65	..	21	40	310	210	16	36	..	..	20	21	1	..

Auckland also exported 3 crates and 72 fowls to the Pacific islands, and 4 ducks to Australia; and 30 horses and 58 various animals for Wirth's Circus to Sydney.

Dunedin exported 5 bears to Australia for Fullers (Limited).

Following are particulars of the horses exported: Thoroughbred—3 stallions, 5 geldings, 7 colts, 4 fillies; trotting—2 stallions; draught—11 mares, 8 stallions, 6 colts, 8 geldings; unspecified—32.